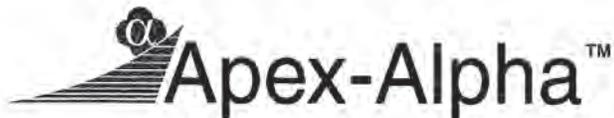


US EPA ARCHIVE DOCUMENT

Appendix C.1. - Data Validation Reports



Sample Description: DUP 01 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 05
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_040
 Chamber Serial Number: 06027396B
 Detector Serial Number: 91135
 Env. Background: System Bkgd 63328
 Reagent Blank: <not performed>

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/9/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:53 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.606 mL
 Effective Efficiency: 0.0204 +/- 0.0033
 Counting Efficiency: 0.1900 +/- 0.0033 on 12/16/2012 5:49:33 PM
 Chem. Recovery Factor: 0.1075 +/- 0.0174

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide		Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T	5.280	39.83	31.13	0.17	0.00E+000	7.4
U-234		4.747	3.00	130.67	0.00	0.00E+000	3.0
U-235		4.398	-0.17	1169.4	0.17	0.00E+000	0.0
U-238		4.148	0.00	1960.0	0.00	0.00E+000	0.0

T = Tracer Peak used for Effective Efficiency

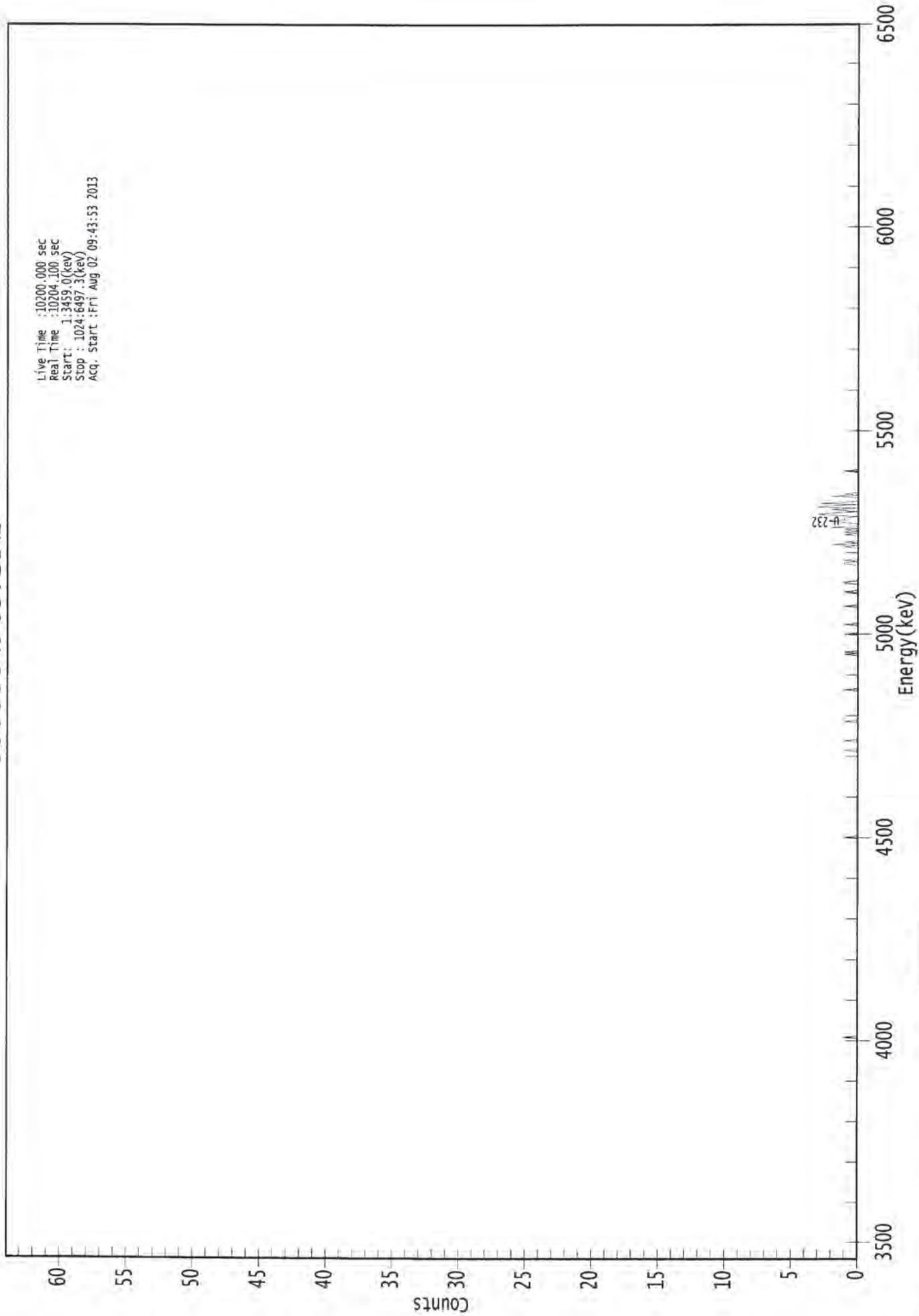
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.997	5302.50*	1.04E+001 +/- 3.26E+000	1.09E+000 +/- 3.41E-001
U-234	0.999	4761.50*	7.80E-001 +/- 1.05E+000	1.56E+000 +/- 4.90E-001
U-235	0.999	4385.50*	-5.45E-002 +/- 6.38E-001	1.34E+000 +/- 4.21E-001
U-238	0.991	4184.40*	0.00E+000 +/- 7.17E-001	1.55E+000 +/- 4.88E-001

AG
 8/2/13

0000064963.CNF

Live Time : 10200.000 sec
Real Time : 10204.100 sec
Start : 1:3459.0(kev)
Stop : 1024:6497.3(kev)
Acq. Start : Fri Aug 02 09:43:53 2013





Apex-Alpha™

KP
8/15/13

Sample Description: LR-104 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000662
 Batch Identification: 1307170A-UU
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_029
 Chamber Serial Number:
 Detector Serial Number: 29
 Env. Background: System Bkgd 64779
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/22/2013 12:02:00 PM
 Acquisition Date/Time: 8/15/2013 12:41:19 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.0287 +/- 0.0040
 Counting Efficiency: 0.1945 +/- 0.0036 on 12/15/2012 2:30:02 PM
 Chem. Recovery Factor: 0.1473 +/- 0.0205

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	5.271	55.64	26.65	1.36	0.00E+000	4.1
U-234	4.732	25.32	39.56	0.68	0.00E+000	3.1
U-235	4.394	0.49	416.98	0.51	0.00E+000	3.1
U-238	4.153	13.49	54.53	0.51	0.00E+000	4.7

T = Tracer Peak used for Effective Efficiency

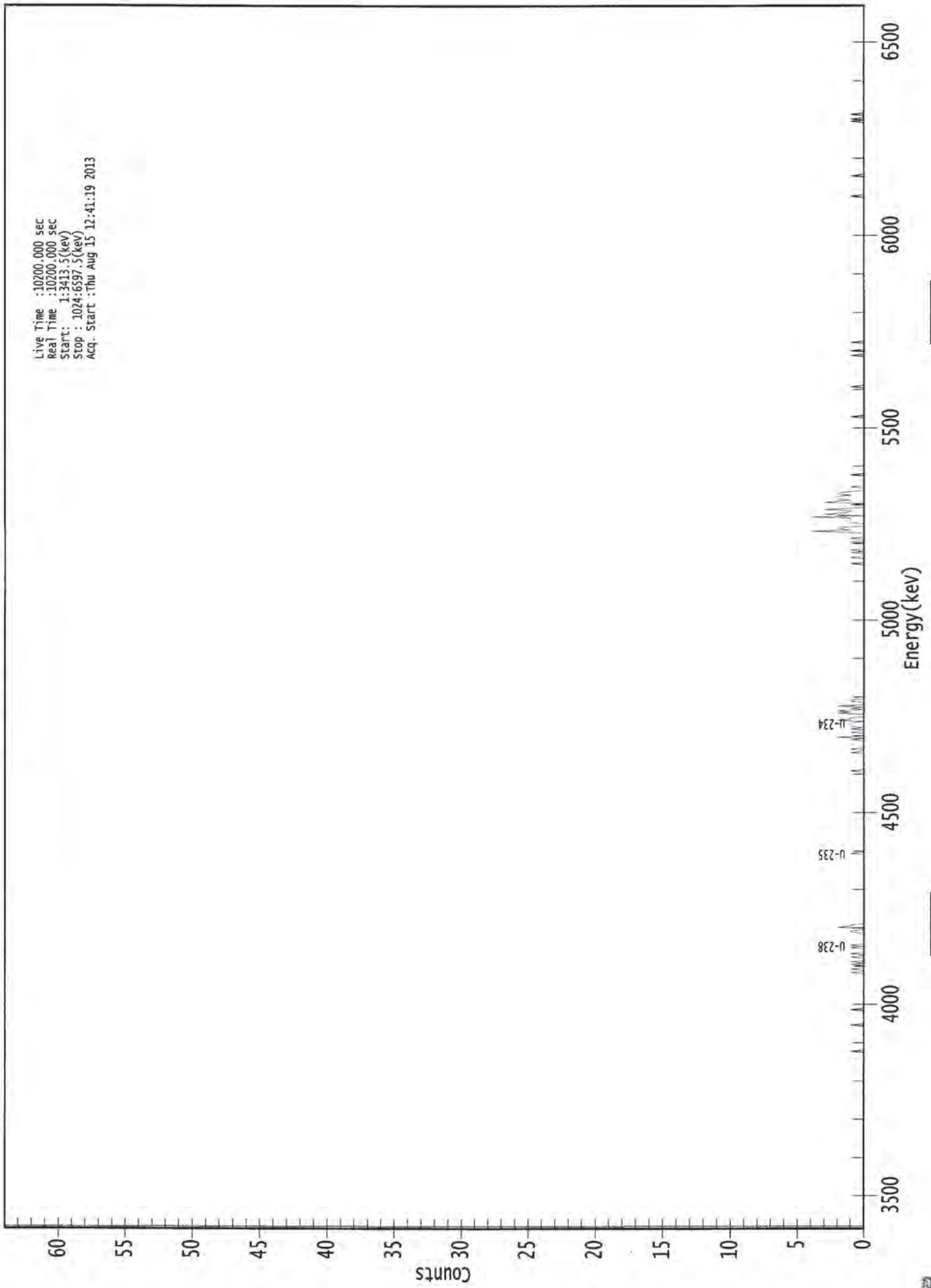
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.16E+000 +/- 1.39E+000	6.36E-001 +/- 1.72E-001
U-234	0.994	4761.50*	2.35E+000 +/- 1.12E+000	5.23E-001 +/- 1.41E-001
U-235	0.999	4385.50*	5.60E-002 +/- 2.34E-001	6.00E-001 +/- 1.62E-001
U-238	0.993	4184.40*	1.24E+000 +/- 7.57E-001	4.84E-001 +/- 1.31E-001

AG
8/16/13

0000066268.CNF

Live Time : 10200.000 sec
Real Time : 10200.000 sec
Start : 1:3413.5(kev)
Stop : 1024:6597.5(kev)
Acq. Start : Thu Aug 15 12:41:19 2013



ROI Type: 3

ROI Type: 1

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
IDG: 160-3110
REACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PURGE TANK
SAMPLE DATE(S): 7/24/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: <u>MB 160-63939/1</u> alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: <u>CCB 160-64282/35</u> Cl (0.0275 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for NO3, Cl, Br, SO4 was performed on PURGE TANK - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
IDG: 160-3110
REACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PURGE TANK
SAMPLE DATE(S): 7/24/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Duplicate Sample Analysis	MS recovery within lab established limits	MS analysis for I, NO3, Cl, Br, SO4 was performed on PURGE TANK - results were in control	None
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3110
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PURGE TANK
SAMPLE DATE(S): 7/24/2013

	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
CRITERIA			
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	No MS/MSD performed with this SDG	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-63151/4</u> - results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-63151/2</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were associated to this SDG	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSY 07/22/2013 23:34</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-63151/3</u> - results were in control RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	None
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor; CCV = Continuing Calibrat
 TCL = Target Compound List; TIC = Tentatively Identified Compound

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3110
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PURGE TANK
SAMPLE DATE(S): 7/24/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met.	None
Calibration	Calibration every 24 hours Hg r ² ≥ 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90- 110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	Method blanks: <u>MB 160-63421/1-A (total and dissolved)</u> - no analytes detected <u>MB 160-64080/1-A: Hg (Total)</u> - no analytes detected <u>MB 160-64081/1-A: Hg (dissolved)</u> - no analytes detected Equipment blank: No equipment blanks associated to this SDG. CCBs: Metals CCBs - no detects Hg CCBs - no detects	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3110
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PURGE TANK
SAMPLE DATE(S): 7/24/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on PURGE TANK for dissolved Hg - results were in control	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on PURGE TANK for dissolved Hg - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3110
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PURGE TANK
SAMPLE DATE(S): 7/24/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response
TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3079
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-100-KS
SAMPLE DATE(S): 7/23/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 3° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: <u>MB 160-63939/1</u> alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for NO3, Cl, Br, SO4 was performed on PZ-100-KS - results were in control Lab duplicate for I was performed on PZ-102R-SS - results were in control	None
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for I, NO3, Cl, Br, SO4 was performed on PZ-100-KS - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3079
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-100-KS
SAMPLE DATE(S): 7/23/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5XRL	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3079
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PZ-100-KS
SAMPLE DATE(S): 7/23/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 3° C. All holding time criteria met.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed on a sample from another project	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-62847/4</u> - results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-62847/2</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were associated to this SDG	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSY 07/22/2013 23:34</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-62847/3</u> Chloroethane 22.2% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	None
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3079
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-100-KS
SAMPLE DATE(S): 7/23/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 3° C. All holding time criteria met.	None
Calibration	Calibration every 24 hours Hg r ² ≥ 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	Method blanks: <u>MB 160-63421/1-A (total and dissolved)</u> - no analytes detected <u>MB 160-62431/1-A: Hg (Total)</u> - no analytes detected <u>MB 160-62433/1-A: Hg (dissolved)</u> - no analytes detected Equipment blank: No equipment blanks associated to this SDG. CCBs: CCB 160-63920/28 (total and dissolved) Co 6.2 ug/L - associated sample were not detected - no qualifications required Hg CCBs - no detects	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3079
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-100-KS
SAMPLE DATE(S): 7/23/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on I-73 for total and dissolved Hg: Hg(tot)37%/33% Hg (diss) 34%/33% MS/MSDs performed on PZ-100-KS for dissolved metals - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc	All tot samples Hg J-/UJ- All dissolved samples Hg J-/UJ-
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on PZ-100-KS for dissolved metals - results were in control Serial dilutions were performed on I-73 for total and dissolved Hg - results were in control	

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3079
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-100-KS
SAMPLE DATE(S): 7/23/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3068
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-305-AI, LR-104
SAMPLE DATE(S): 7/22/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 3° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: <u>MB 160-63939/1</u> alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for NO3, Cl, Br, SO4 was performed on PZ-305-AI - results were in control Lab duplicate for I was performed on PZ-102R-SS (SDG 160-3052) - results were in control	None
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for NO3, Cl, Br, SO4 was performed on PZ-305-AI - results were in control MS analysis for I was performed on PZ-102R-SS (SDG 160-3052) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3068
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-305-AI, LR-104
SAMPLE DATE(S): 7/22/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5XRL	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3068
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PZ-305-AI, LR-104
SAMPLE DATE(S): 7/22/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 3° C. All holding time criteria met.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed I-73 (SDG 160-3052) Chloroethane 164%/142% - associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-62292/4-A</u> - results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-62292/3-A</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were associated to this SDG	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-62292/2</u> Chloroethane 38.4% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target	None
Internal Standards	IS areas of samples & blank within (50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. Analytical batch 63435 and 63744: The sample results for iron and magnesium were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that this is an anomaly due to matrix interference. 62879 and 62880: the samples were prepped at a dilution due to their matrix. Samples were light brown in color and had a strong odor.	None
Calibration	Calibration every 24 hours Hg $r^2 \geq 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-62880/1-A (total)</u> - no analytes detected</p> <p><u>MB 160-62879/1-A (dissolved)</u> Mn (11.4 ug/L) - qualify associated detects < 5X blank conc as J+ - qualify associated detects < RL as U Zn (7.4 ug/L) - qualify associated detects < RL as U</p> <p><u>MB 160-62431/1-A: Hg (Total)</u> - no analytes detected</p> <p><u>MB 160-62433/1-A: Hg (dissolved)</u> - no analytes detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-63744/101 (dis)</u> Be (1.6 ug/L) - associated results were not detected - no qualification required</p> <p><u>CCB 160-63280/49 (tot)</u> Be (0.7 ug/L) - associated results were not detected - no qualification required</p> <p><u>CCB 160-63280/85 (tot)</u> Be (1.5 ug/L) - associated results were not detected - no qualification required</p> <p><u>Hg CCBs - no detects</u></p>	<p>I-73 Mn (dis) J+</p> <p>PZ-102R-SS Mn (dis) J+ Zn (dis) U</p> <p>PZ-107-SS Zn (dis) U</p> <p>PZ-106-KS Mn (dis) U</p> <p>DUPLICATE 08 Zn (dis) U</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on I-73 for total metals and Hg: Mn 66%/42% Ag 73%/71% Ba pass/53% Zn 63%/36% Hg 37%/33% qualify associated samples as J/UJ MS/MSDs performed on I-73 for dissolved metals and Hg: Hg 34%/33% qualify associated samples as J/UJ recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-303-AI (SDG 160-3013) for total Hg - all results in control	All tot samples Mn J-/UJ- Ag J-/UJ- Ba J-/UJ- Zn J-/UJ- Hg J-/UJ- All dissolved samples Hg J-/UJ-
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on I-73 total: 1X dilution Al, Ba, Fe, Mn, Zn - qualify associated detects as J/UJ dissolved 1X dilution Ba, Fe, Mn, Zn - qualify associated detects as J/UJ	all samples total (1X) Al J/UJ Ba J/UJ Fe J/UJ Mn J/UJ Zn J/UJ all samples dissolved (1X) Ba J/UJ Fe J/UJ Mn J/UJ Zn J/UJ

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 08 was collected as a field dup of PZ-107-SS - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: MB 160-63730/1 alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: <u>CCB 160-62889/61</u> Cl (0.0212 mg/L) = all associated sample conc >5X blank conc X DF - no qualification required <u>CCB 160-62889/71</u> Cl (0.0728 mg/L) - qualify associated detects < 5X blank conc X DF as J+	PZ-102-SS Cl J+
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for I, NO3, Cl, Br, SO4 was performed on PZ-102R-SS - results were in control Lab duplicate for alkalinity was performed on I-73 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for I, NO3, Cl, Br, SO4 was performed on PZ-102R-SS - results were in control MS analysis for alkalinity was performed on I-73 - results were in control	None
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 08 was collected as a field dup of PZ-107-SS - all results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met. The following samples effervesced when HCl was added - they were not preserved and have a 7 day holding time: I-73, PZ-103-SS, PZ-107-SS, DUPLICATE 08	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed I-73 Chloroethane 164%/142% - associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-62292/4-A</u> - results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-62292/3-A</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	Field blank at I-73 - no analytes were detected	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-62292/2</u> Chloroethane 38.4% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	None
Internal Standards	IS areas of samples & blank within (50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 08 was collected as a field dup of PZ-107-SS - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. Analytical batch 63435 and 63744: The sample results for iron and magnesium were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that this is an anomaly due to matrix interference. 62879 and 62880: the samples were prepped at a dilution due to their matrix. Samples were light brown in color and had a strong odor.	None
Calibration	Calibration every 24 hours Hg $r^2 \geq 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-62880/1-A (total)</u> - no analytes detected</p> <p><u>MB 160-62879/1-A (dissolved)</u> Mn (11.4 ug/L) - qualify associated detects < 5X blank conc as J+ - qualify associated detects < RL as U Zn (7.4 ug/L) - qualify associated detects < RL as U</p> <p><u>MB 160-62431/1-A: Hg (Total)</u> - no analytes detected</p> <p><u>MB 160-62433/1-A: Hg (dissolved)</u> - no analytes detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-63744/101 (dis)</u> Be (1.6 ug/L) - associated results were not detected - no qualification required</p> <p><u>CCB 160-63280/49 (tot)</u> Be (0.7 ug/L) - associated results were not detected - no qualification required</p> <p><u>CCB 160-63280/85 (tot)</u> Be (1.5 ug/L) - associated results were not detected - no qualification required</p> <p><u>Hg CCBs - no detects</u></p>	<p>I-73 Mn (dis) J+</p> <p>PZ-102R-SS Mn (dis) J+ Zn (dis) U</p> <p>PZ-107-SS Zn (dis) U</p> <p>PZ-106-KS Mn (dis) U</p> <p>DUPLICATE 08 Zn (dis) U</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on I-73 for total metals and Hg: Mn 66%/42% Ag 73%/71% Ba pass/53% Zn 63%/36% Hg 37%/33% qualify associated samples as J/UJ MS/MSDs performed on I-73 for dissolved metals and Hg: Hg 34%/33% qualify associated samples as J/UJ recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-303-AI (SDG 160-3013) for total Hg - all results in control	All tot samples Mn J-/UJ- Ag J-/UJ- Ba J-/UJ- Zn J-/UJ- Hg J-/UJ- All dissolved samples Hg J-/UJ-
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on I-73 total: 1X dilution Al, Ba, Fe, Mn, Zn - qualify associated detects as J/UJ dissolved 1X dilution Ba, Fe, Mn, Zn - qualify associated detects as J/UJ	all samples total (1X) Al J/UJ Ba J/UJ Fe J/UJ Mn J/UJ Zn J/UJ all samples dissolved (1X) Ba J/UJ Fe J/UJ Mn J/UJ Zn J/UJ

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3052
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-73, PZ-103-SS, PZ-102R-SS, PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUPLICATE 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 08 was collected as a field dup of PZ-107-SS - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3040
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S): 7/18/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: MB 160-63730/1 alkalinity (0.25 mg/L) - all associated sample conc > 5X blank conc XDF - no qualification required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes detected	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on S-53 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3040
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S): 7/18/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for I was performed on S-53 - results were in control MS analysis for NO3, Br, Cl and SO4 was performed on PZ-102R-SS (SDG 160-3052) - results were in control	None
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5XRL	The following field duplicates were collected with this sample set. DUP 07 was collected as a field dup of I-65 - all results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3040
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S): 7/18/2013

	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
CRITERIA			
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control except for sample PZ-205-AS 4-Bromofluorobenzene 80% - qualify results as J/UJ	PZ-205-AS all compounds J/UJ
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed LR-100 (SDG 160-3013) Chloroethane 190%/185% - associated samples were not detected - no qualification required Bromoform 83%/pass - qualify results as J/UJ Dichlorodifluoromethane 77%/82%	All samples Bromoform J/UJ Dichlorodifluoromethane J/UJ
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-61804/4-A</u> Chloroethane (170%) - associated samples were not detected - no qualification required <u>LCS 160-62292/4-A</u> - results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-61804/3-A</u> - no analytes were detected <u>MB 160-62292/3-A</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were collected with this sample set.	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3040
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S): 7/18/2013

	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
CRITERIA			
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-61804/2</u> Chloroethane 86.3% - associated samples were not detected - no qualification required <u>CCVIS 160-62292/2</u> Chloroethane 38.4% - not a target for the sample analyzed RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	None
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 07 was collected as a field dup of I-65 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3040
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S): 7/18/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. The sample results for antimony, iron, magnesium, manganese, and sodium and were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that	None
Calibration	Calibration every 24 hours Hg $r^2 \geq 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3040
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S): 7/18/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-62880/1-A (total)</u> - no analytes detected</p> <p><u>MB 160-62879/1-A (dissolved)</u> Mn (11.4 ug/L) - qualify associated detects < 5X blank conc as J+ - qualify associated detects < RL as U Zn (7.4 ug/L) - qualify associated detects < RL as U</p> <p><u>MB 160-62431/1-A: Hg (Total)</u> - no analytes detected</p> <p><u>MB 160-62433/1-A: Hg (dissolved)</u> - no analytes detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-63744/101 (dis)</u> Be (1.6 ug/L) - associated results were not detected - no qualification required</p> <p><u>CCB 160-63280/49 (tot)</u> Be (0.7 ug/L) - qualify associated detects < RL as U</p> <p>Hg CCBs - no detects</p>	<p>S-53 Zn (dis) U Be (tot) U</p> <p>D-14 Zn (dis) U</p> <p>PZ-205-AS Zn (dis) U Be (tot) U</p> <p>I-65 Mn (dis) J+</p> <p>PZ-104-KS Mn (dis) U</p> <p>PZ-206-SS Mn (dis) J+</p> <p>DUPLICATE 07 Mn (dis) J+</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD < 20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3040
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: S-53, D-14, PZ-205-AS, I-65, D-13, PZ-104-KS, PZ-206-SS, PZ-207-AS, DUPLICATE 07 (Field duplicate of I-65)
SAMPLE DATE(S): 7/18/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on I-73 (SDG 160-3052) for total and dissolved metals and Hg Mn (tot) 66%/42% Ag (tot) 73%/71% Ba (tot) pass/53% Zn (tot) 63%/36% Hg (tot) 37%/33% Hg (dis) 34%/33%	all samples Mn (tot) UJ-/J- Ag (tot) UJ-/J- Ba (tot) UJ-/J- Zn (tot) UJ-/J- Hg (tot) UJ-/J- Hg (dis) UJ-/J-
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on I-73 (SDG 160-3052) for total and dissolved metals and Hg - all results in control	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 07 was collected as a field dup of I-65 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3022
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S): 7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples. There was a discrepancy between the containers received and the COC. The bottle ID was PZ-100-KS and the COC read PZ-111-KS. PZ-111-KS was correct.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: no analytes detected Equipment blank: No equipment blanks were collected for these methods. CCBs: CCB 160-63933/46 Chloride 0.0215 mg/L - all samples concentrations > 5X the blank value X Dilution Factor - no qualification required	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on LR-100 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3022
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S): 7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on LR-100 Iodide (87%) - qualify associated samples as J-/UJ- MS analysis for bromide and NO3 was performed on PZ-102R-SS (SDG 160-3052) - results were in control	all samples I J-/UJ-
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5XRL	The following field duplicates were collected with this sample set. DUP 06 was collected as a field dup of D-81 - all results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3022
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S): 7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met. There was a discrepancy between the containers received and the COC. The bottle ID was PZ-100-KS and the COC read PZ-111-KS. PZ-111-KS was correct.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control except for sample LR-100	LR-100 all compounds J/UJ
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed LR-100 Chloroethane 190%/185% - associated samples were not detected - no qualification required Bromoform 83%/pass - qualify results as J/UJ Dichlorodifluoromethane 77%/82% - qualify results as J/UJ	All samples Bromoform J/UJ Dichlorodifluoromethane J/UJ
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-61804/4-A</u> Chloroethane (170%) - associated samples were not detected - no qualification required	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-61804/3-A</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were collected with this sample set.	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3022
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S): 7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-61804/2</u> Chloroethane 86.3% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for	None
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 06 was collected as a field dup of D-81 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3022
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S): 7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. There was a discrepancy between the containers received and the COC. The bottle ID was PZ-100-KS and the COC read PZ-111-KS. PZ-111-KS was correct. The sample results for aluminum and iron were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that this is an anomaly due to matrix interference.	None
Calibration	Calibration every 24 hours Hg $r^2 \geq 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3022
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S): 7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-61454/1-A (total)</u> Co (5.9 ug/L) - qualify associated detects <RL as U</p> <p><u>MB 160-61452/1-A (dissolved)</u> - no analytes detected</p> <p><u>MB 160-61467/1-A: Hg (Total)</u> - no analytes detected</p> <p><u>MB 160-61468/1-A: Hg (dissolved)</u> - no analytes detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-61766/98 (dis)</u> Se (2.9 ug/L) - qualify associated detects <RL as U</p> <p><u>CCB 160-61766/110 (dis)</u> Se (3.2 ug/L) - qualify associated detects <RL as U</p> <p><u>CCB 160-62409/26 and 37 (tot)</u> - no detects</p> <p>Hg CCBs - no detects</p>	<p>D-81 Co (tot) U</p> <p>PZ-203-SS Co (tot) U</p> <p>LR-103 Se (dis) U</p> <p>D-87 Se (dis) U</p> <p>DUPLICATE 06 Co (tot) U</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and TI	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3022
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS, PZ-203-SS, D-87, DUPLICATE 06 (Field dup of D-81)
SAMPLE DATE(S): 7/17/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on D-12 (SDG 160-3000) for dissolved metals and dissolved Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-208-SS (SDG 160-3013) for total metals and dissolved Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-304-AI (SDG 160-3013) for total Hg - all results in control	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on PZ-208-SS (SDG 160-3013) for total metals and dissolved Hg. Serial dilutions were performed on a West Lake sample from another SDG for dissolved metals Serial dilutions were performed on PZ-303-AI (SDG 160-3013) for total Hg. All results were in control	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 06 was collected as a field dup of D-81 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3013
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S): 7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples. PZ-304-AI on COC (this was correct), bottles labeled PZ-303-AI (this is the label in the data package)	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: no analytes detected Equipment blank: No equipment blanks were collected for these methods. CCBs: CCB 12:27 Chloride 0.0214 mg/L - all samples concentrations > 5X the blank value X Dilution Factor - no qualification required	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on PZ-208-SS - results were in control Lab duplicate for alkalinity was performed on PZ-303-AI - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3013
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S): 7/16/2013

	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
CRITERIA			
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on PZ-208-SS Chloride (112%) - qualify associated samples as J+ MS analysis for alkalinity was performed on PZ-303-AI - results were in control	all samples Cl J+
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3013
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PZ-208-SS, PZ-303-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S): 7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met. PZ-304-AI on COC (this was correct), bottles labeled PZ-303-AI (this is the label in the data package)	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control except for sample MW-104 4-Bromofluorobenzene 80% - qualify results as J/UJ	MW-104 all compounds J/UJ
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed PZ-208-SS Chloroethane 172%/146% - associated samples were not detected - no qualification required Bromoform pass/82% - qualify results as J/UJ	All samples Bromoform J/UJ
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-61806/4-A</u> Chloroethane (150%) - associated samples were not detected - no qualification required	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-61806/3-A</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	None
	Equipment Blanks	No field blanks were collected with this sample set.	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3013
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PZ-208-SS, PZ-303-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S): 7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	CCVIS 160-61806/2 Chloroethane 36.2% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	None
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3013
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-208-SS, PZ-303-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S): 7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. PZ-208-SS (160-3013-1): The sample results for aluminum and were observed outside the dissolved verses total criteria. All other elements were within QC limits, indicating that this is an anomaly due to matrix interference. PZ-304-AI on COC (this was correct), bottles labeled PZ-303-AI (this is the label in the data package)	None
Calibration	Calibration every 24 hours Hg $r^2 \geq 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3013
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-208-SS, PZ-303-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S): 7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-61454/1-A (total)</u> Co (5.9 ug/L) - qualify associated detects <RL as U</p> <p><u>MB 160-61452/1-A (dissolved)</u> - no analytes detected</p> <p><u>MB 160-61467/1-A: Hg (Total)</u> - no analytes detected</p> <p><u>MB 160-61468/1-A: Hg (dissolved)</u> - no analytes detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-61766/86 (dis)</u> Se (2.9 ug/L) - qualify associated detects <RL as U</p> <p><u>CCB 160-61766/98 (dis)</u> Se (2.9 ug/L) - qualify associated detects <RL as U</p> <p><u>CCB 160-61766/110 (dis)</u> Se (3.2 ug/L) - qualify associated detects <RL as U</p> <p><u>CCB 160-62409/13 and 26 and 37 (tot)</u> - no detects</p>	<p>PZ-208-SS Se (dis) U</p> <p>PZ-303-AI (PZ-304-AI) Co (tot) U Se (dis) U</p> <p>PZ-304-AS Co (tot) U</p> <p>MW-104 Co (tot) U Se (dis) U</p> <p>PZ-204A-AS Co (tot) U</p> <p>PZ-302-AI Co (tot) U</p> <p>PZ-302-AS Co (tot) U Se (dis) U</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3013
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-208-SS, PZ-303-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI, PZ-302-AS
SAMPLE DATE(S): 7/16/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on PZ-208-SS for total and dissolved metals and dissolved Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on PZ-303-AI for total Hg - all results in control	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on PZ-208-SS for total metals and dissolved Hg. Serial dilutions were performed on a West Lake sample from another SDG for dissolved metals Serial dilutions were performed on PZ-303-AI for total Hg. All results were in control	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	No field duplicates were collected with this sample set.	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 3° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: MB 160-63159/1 - Alkalinity 0.250 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for alkalinity, bromide, I, Cl, SO4, and NO3 was performed on S-8 - results were in control NO3 - 28% RPD - difference < RL - no qualification required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for alkalinity, bromide, I, Cl, SO4, and NO3 was performed on D-12 - results were in control	None
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5XRL	The following field duplicates were collected with this sample set. DUP 05 was collected as a field dup of D-12 Alkalinity was out of control at 46% - qualify associated samples as J	all samples Alk J

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 3° C. All holding time criteria met.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed D-12 Chloroethane 129%/129% - qualify associated detects as J+ 2-Hexanone pass/126% - associated samples were not detected - no qualification required	PZ-303-AS Chloroethane J+ I-11 Chloroethane J+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<p><u>LCS 160-61405/4 and LCSD 160-61405/5</u> 1,2-Dichloroethane (125%/pass) - qualify associated detects as J+ Chloroethane (pass/132%) - qualify associated detects as J+ 2-Hexanone (132%/135%) - associated samples were not detected - no qualification required 4-Methyl-2-pentanone (pass/130%) - associated samples were not detected - no qualification required Methylene Chloride (pass/83%) - qualify associated samples as J-/UJ- trans-1,2-Dichloroethene (82%/81%) - qualify associated samples as J-/UJ-</p> <p><u>LCS 160-62292/4-A</u> - results were in control</p>	<p>I-66 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>MW-102 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>MW-103 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-J</p> <p>PZ-303-AS Chloroethane J+ Methylene Chloride UJ- trans-1,2-Dichloroethene J-</p> <p>I-11 Chloroethane J+ Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>S-10 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>D-12 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>DUPLICATE 05 1,2-Dichloroethane J+ Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-61405/2</u> 4-Methyl-2-pentanone (2.49 ug/L) - associated samples were not detected - no qualification required <u>MB 160-62292/3-A</u> - no analytes were detected	None
	Trip Blanks	no analytes were detected	
	Equipment Blanks	Field Blank at D-12 - no analytes were detected	
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSY 06/29/2013 10:56:</u> All %RSD criteria met. <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-61405/3</u> Chloroethane 77.1% - associated samples were not detected - no qualification required Trichlorofluoromethane 24.8% - associated samples were not detected - no qualification required Acetone 30.4% - associated samples were not detected - no qualification required 1,2-Dichloroethane 33.8% - qualify associated detects as J+ 4-Methyl-2-pentanone 36.5% - qualify associated detects as J+ 2-Hexanone 34.3% - associated samples were not detected - no qualification required <u>CCVIS 160-62292/2 for 4-Methyl-2-pentanone and m&p-Xylenes - results were in control</u>	PZ-303-AS Chloroethane J+ I-11 Chloroethane J+ DUPLICATE 05 1,2-Dichloroethane J+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this RPD.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 05 was collected as a field dup of D-12 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable Limits / Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 3° C. All holding time criteria met.	None
Calibration	Calibration every 24 hours Hg r ² ≥ 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable Limits / Criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-60996/1-A (total and dissolved)</u> Be (0.8 ug/L) - all associated samples were not detected - no qualification required</p> <p><u>MB 160-61452/1-A (dissolved)</u> - no analytes detected</p> <p><u>MB 160-60789/1-A: Hg (Total)</u> - no analytes detected</p> <p><u>MB 160-60793/1-A: Hg (dissolved)</u> - no analytes detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-61766/50 (tot & dis)</u> Se (3.3 ug/L) - qualify associated detects <RL as U</p> <p><u>CCB 160-61766/74</u> Se (3.0 ug/L) - qualify associated detects <RL as U</p> <p><u>CCB 160-61766/86 and 98</u> Se (2.9 ug/L) - qualify associated detects <RL as U</p> <p>Hg CCBs - no detects</p>	<p>I-66 Se (tot) U Se (dis) U</p> <p>MW-102 Se (dis) U</p> <p>MW-103 Se (tot) U</p> <p>PZ-303-AS Se (tot) U Se (dis) U</p> <p>I-11 Se (dis) U</p> <p>S-10 Se (tot) U Se (dis) U</p> <p>D-12 Se (tot) U Se (dis) U</p> <p>DUPLICATE 05 Se (tot) U Se (dis) U</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-3000
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10, D-12, DUPLICATE 05 (Field dup of D-12)
SAMPLE DATE(S): 7/15/2013

CRITERIA	Acceptable Limits / Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on D-12 for total and dissolved metals - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on I-66 for Hg - all results in control	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on D-12 for metals and Hg. Co (dis) 99% - not applicable - sample conc <50XDL	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 05 was collected as a field dup of D-12 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: MB 160-63159/1 - Alkalinity 0.250 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on S-8 - results were in control	None
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on S-8 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 04 was collected as a field dup of I-62 - all results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed on DUPLICATE 04 Chloroethane 129%/129% - all associated samples were not detected - no qualification required 2-Hexanone ok/126% - all associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	<u>LCS 160-61405/4 and LCSD 160-61405/5</u> 1,2-Dichloroethane (125%/pass) - qualify associated detects as J+ Chloroethane (pass/132%) - all associated samples were not detected - no qualification required 2-Hexanone (132%/135%) - associated samples were not detected - no qualification required 4-Methyl-2-pentanone (pass/130%) - qualify associated detects as J+ Methylene Chloride (pass/83%) - qualify associated samples as J-/UJ- trans-1,2-Dichloroethene (82%/81%) - qualify associated samples as J-/UJ-	<p>D-6 1,2-Dichloroethane J+ Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>S-8 4-Methyl-2-pentanone J+ Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>PZ-105-SS Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>I-62 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
			<p>PZ-114-AS Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>S-61 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>I-67 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>I-68 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p> <p>DUPLICATE 04 Methylene Chloride UJ- trans-1,2-Dichloroethene UJ-</p>
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-61405/2</u> 4-Methyl-2-pentanone (2.49 ug/L) - qualify associated detects <RL as U	S-8 4-Methyl-2-pentanone U
	Trip Blanks	no trip blank received with this sample set although it was listed on COC	
	Equipment Blanks	No equipment blank was associated to this sample set	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSY 06/29/2013 10:56:</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per	<u>CCVIS 160-61405/3</u>	S-8

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
	instrument. %D ≤ 20%. RRFs ≥ 0.05	Chloroethane 77.1% - associated samples were not detected - no qualification required Trichlorofluoromethane 24.8% - associated samples were not detected - no qualification required Acetone 30.4% - associated samples were not detected - no qualification required 1,2-Dichloroethane 33.8% - qualify associated detects as J+ 4-Methyl-2-pentanone 36.5% - qualify associated detects as J+ 2-Hexanone 34.3% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target	4-Methyl-2-pentanone J+ D-6 1,2-Dichloroethane J+
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 04 was collected as a field dup of I-62 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met.	None
Calibration	Calibration every 24 hours Hg $r^2 \geq 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control except one ICV was out of control for Tl at 111% but there was a passing CCV analyzed before samples were run	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-60807/1-A (dissolved)</u> Zn (7.1 ug/L) - qualify associated detects <RL as U</p> <p><u>MB 160-60809/1-A (total)</u> - no analytes detected</p> <p><u>MB 160-60789/1-A: Hg (Total)</u> - no analytes detected</p> <p><u>MB 160-60793/1-A: Hg (dissolved)</u> (0.117 ug/L) - qualify associated detects <RL as U</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-61576/85 (tot)</u> As (2.5 ug/L) - qualify associated detects <RL as U, qualify detects <5X the blank conc as J+ Cd (1.8 ug/L) -- qualify associated detects <RL as U Pb (1.9 ug/L) - qualify associated detects <RL as U</p> <p>Hg CCBs - no detects</p>	<p>S-8 Zn (dis) U Hg (dis) U</p> <p>PZ-105-SS Zn (dis) U Hg (dis) U</p> <p>I-62 Zn (dis) U Hg (dis) U</p> <p>PZ-114-AS Zn (dis) U Hg (dis) U</p> <p>D-6 Hg (dis) U As (tot) U Pb (tot) U</p> <p>S-61 Hg (dis) U As (tot) U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
			I-67 Hg (dis) U As (tot) U Pb (tot) U I-68 Zn (dis) U Hg (dis) U As (tot) J+ Cd (tot) U DUPLICATE 04 Hg (dis) U Pb (tot) U
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on DUPLICATE 04 for total and dissolved metals and Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc MS/MSDs performed on S-8 for Hg - all results in control MS/MSD for remaining metals performed on DUPLICATE 04 - results were in control	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2984
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: S-8, PZ-105-SS, I-62, PZ-114-AS, D-6, S-61, I-67, I-68, DUPLICATE 04 (Field dup of I-62)
SAMPLE DATE(S): 7/12/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on DUPLICATE 04 for metals and Hg. - results were in control	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 04 was collected as a field dup of I-62 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2968
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
 DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: MB 160-62899/1 - Alkalinity 0.350 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for ALK, bromide, I, Cl, SO4, and NO3 was performed on PZ-202-SS - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2968
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
 DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for Alkalinity, bromide, I, Cl, SO4, and NO3 was performed on PZ-202-SS - results were in control MS analysis for bromide, Cl, SO4, and NO3 was performed on PZ-116-SS - results were in control	None
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5XRL	The following field duplicates were collected with this sample set. DUP 03 was collected as a field dup of D-83 - all results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2968
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
 PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLES: DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met. Samples PZ* were logged in as P2	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed on PZ-202-SS Chloroethane 127%/131% - associated samples were not detected - no qualification required 2-Hexanone 125% - associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS results for target compounds were within control limits <u>LCS 160-60813/4-A</u> 2-Hexanone 124% - associated samples were not detected - no qualification required <u>LCS 160-61806/4-A</u> all results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-60813/3-A</u> all compounds were not detected <u>MB 160-61806/3-A</u> all compounds were not detected	PZ-113-SS Acetone U PZ-104-SS Acetone U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2968
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
 PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLES: DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
	Trip Blanks	Acetone (8.0 ug/L) - qualify associated samples <RL as U - qualify associates sample concs <5X blank conc X dil factor as J+	PZ-101-SS Acetone J+ PZ-202-SS Acetone J+ S-82 Acetone J+ I-9 Acetone U PZ-115-SS Acetone U
	Equipment Blanks	FB at PZ-202-SS Acetone (12 ug/L) - qualify associated samples as J+	DUPLICATE 03 Acetone U
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits.	Initial Calibration <u>Instrument MSX 07/15/2013 11:23</u> All %RSD criteria met. <u>Instrument MSY 06/29/2013 10:56:</u> All %RSD criteria met. Average RRF meets requirements.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-61806/2</u> Chloroethane 36.2% -qualify associated detects as J+	PZ-104-SS Chloroethane J+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2968
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
 PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLES: DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
		<u>CCVIS 160-60813/2</u> Chloroethane 27% - associated samples were not detected - no qualification required Methyl acetate 21.6% - associated samples were not detected - no qualification required RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	PZ-104-SD Chloroethane J+
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 03 was collected as a field dup of D-83 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; TIC = Tentatively Identified Compound CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2968
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met.	None
Calibration	Calibration every 24 hours Hg r ² ≥ 0.995 CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control except one ICV was out of control for Tl at 111% but there was a passing CCV analyzed before samples were run	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2968
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-60808/1-A (dissolved)</u> - no analytes detected <u>MB 160-60810/1-A (total)</u> - no analytes detected <u>MB 160-60787/1-A: Hg (Total)</u> - no analytes detected <u>MB 160-60792/1-A: Hg (dissolved)</u> - no analytes detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-61388/61 (dis)</u> Be (1.2 ug/L) - associated samples were not detected <u>CCB 160-61388/73 (dis)</u> Be (0.7 ug/L) - associated samples were not detected or >5X the blank conc <u>CCB 160-61576/13 (tot)</u> As (4.0 ug/L) - qualify associated detects <RL as U, qualify detects <5X the blank conc as J+ Cd (2.5 ug/L) - associated samples were not detected Pb (2.4 ug/L) - qualify associated detects <RL as U Se (4.2 ug/L) - associated samples were not detected</p> <p>Hg CCBs - no detects</p>	<p>PZ-113-SS As (tot) U Pb (tot) U</p> <p>PZ-104-SS As (tot) U Pb (tot) U</p> <p>PZ-101-SS As (tot) U Pb (tot) U</p> <p>PZ-104-SD As (tot) J+ Pb (tot) U</p> <p>PZ-202-SS As (tot) U Pb (tot) U</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2968
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD, PZ-202-SS, D-83, MW-1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS DUPLICATE 03 (FIELD DUP OF D-83)
SAMPLE DATE(S): 7/11/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSDs performed on PZ-202-SS for total and dissolved metals and Hg - all results in control considering that recoveries could not be calculated for some analytes where the sample conc was > 4X the spike conc	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on PZ-202-SS for metals and Hg. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 03 was collected as a field dup of D-83 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate; CCV = Continuing Calibration Verification

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2953
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: 02
SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.	None
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.	None
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: Alkalinity 0.250 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs	None
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.	None
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for ALK, bromide, I, Cl, SO4, and NO3 was performed on PZ-201A-SS - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2953
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: 02
SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Spike Sample Analysis	MS recovery within lab established limits	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on PZ-201A-SS - results were in control	None
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 02 was collected as a field dup of PZ-113-AD - all results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2953
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02 (Field dup of
SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met. Samples PZ* were logged in as P2	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed on PZ-201A-SS Chloroethane 130%/126% - associated samples were not detected - no qualification required Trichlorofluoromethane 121%/117% - associated samples were not detected - no qualification required 2-Hexanone 125% - associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS results for target compounds were within control limits <u>LCS 160-60980/4</u> 2-Hexanone 130% - associated samples were not detected - no qualification required 4-Methyl-2-pentanone (MIBK) 128% - associated samples were not detected - no qualification required Chloroethane 131% - associated samples were not detected - no qualification required	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-60980/2</u> all compounds were not detected	None
	Trip Blanks	all compounds were not detected	None
	Equipment Blanks	None	None
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits..	Initial Calibration <u>Instrument MSY 06/29/2013 10:56:</u> All %RSD criteria met. Average RRF meets requirements.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2953
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02 (Field dup of
SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-60980/3</u> Chloroethane 41.6% - associated samples were not detected - no qualification required 2-Hexanone 29.7% - associated samples were not detected - no qualification required	None
Internal Standards	IS areas of samples & blank within (-50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 02 was collected as a field dup of PZ-113-AD - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 CCV = Continuing Calibration Verification; TCL = Target Compound List; TIC = Tentatively Identified Compound

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2953
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02
SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met.	None
Calibration	Calibration every 24 hours Hg $r^2 \geq 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2953
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02
SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-60807/1-A (dissolved)</u> Zn 7.1 ug/L - qualify associated sample detects < RL as U - qualify associated sample detects > RL but < 5X blank conc X DF as J+</p> <p><u>MB 160-60809/1-A (total)</u> - not detected</p> <p><u>MB 160-60784/1-A: Hg (total)</u> - not detected</p> <p><u>MB 160-60791/1-A: Hg (dissolved)</u> - not detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-61388/13 (dis)</u> Be (2.8 ug/L) - associated samples were not detected Fe (34.6 ug/L) - associated samples were not detected or > 5X blank conc V (5.3 ug/L) - associated samples were not detected</p> <p>Hg CCBs - no detects</p>	<p>PZ-201A-SS Zn (dis) 21 J+</p> <p>PZ-113-AS Zn (dis) 20U</p> <p>PZ-109-SS Zn (dis) 23 J+</p> <p>PZ-205-SS Zn (dis) 20U</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2953
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02
SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	MS/MSD performed on a West Lake sample from another SDG - results were in control.	None
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on PZ-110-SS for metals and H). Results were in control.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2953
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD, PZ-113-AS, PZ-109-SS, PZ-205-SS, DUPLICATE 02
SAMPLE DATE(S): 7/10/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5XRL	The following field duplicates were collected with this sample set. DUP 02 was collected as a field dup of PZ-113-AD - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 CCV = Continuing Calibration Verification; TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate;

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2937
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S): 7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions
Data Completeness, Holding Times & Preservation	Cooler temp < 6 C. Holding time = 28 days for chloride, sulfate, bromide and iodide 14 days for alkalinity 48 hrs for nitrate.	Coolers received at 2° C. Holding time requirements were met for all samples.
Calibration and Continuing Calibration Verification Standards	R2>0.99 CCVs 90-110%	ICVs, CCVs, and Calibrations were in control.
Blanks	Method blanks: 1 per 20 project samples. No analytes detected in MBs, CCBs or EBs.	Method Blank: Alkalinity 0.250 mg/L - all sample concentrations > 5XDFXblank conc - no qualifications required Equipment blank: No equipment blanks were collected for these methods. CCBs: no analytes were detected in the CCBs
Laboratory Control Sample	Recoveries within lab limits.	LCS recoveries were in control.
Lab Duplicates	Lab Duplicate: RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	Lab duplicate for bromide, I, Cl, SO4, and NO3 was performed on PZ-111-SD - results were in control Lab duplicate for Alkalinity was performed on I-4 - results were in control
Spike Sample Analysis	MS recovery within lab	MS analysis for bromide, I, Cl, SO4, and NO3 was performed on PZ-111-SD - results were in control

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2937
FRACTION: Chloride, Sulfate, Nitrate, Bromide and Iodide (EPA 300)/ Alkalinity (EPA 310.1)
MEDIA: GROUNDWATER
SAMPLES: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S): 7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions
	established limits	MS analysis for Alkalinity was performed on I-4 - results were in control
Low Level Control Sample	recovery within 80-120%	Performed on alkalinity only. Results were in control.
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5XRL	The following field duplicates were collected with this sample set. DUP 01 was collected as a field dup of I-4 - all results were in control

Qualifiers Added?
None

Qualifiers Added?
None
None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2937
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S): 7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times, Preservation	Cooler temp < 6 °C. Samples holding time requirement < 7 days (<14 days if HCL preserved).	Coolers received at 2° C. All holding time criteria met. Sample S-5 was unpreserved because it effervesced when HCl was added in the field. Holding time is 7 days.	None
System Monitoring Compounds	recoveries within limits (70 - 130%) or laboratory established limits	System monitoring compound recoveries were in control.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples. Recoveries and RPDs within lab limits	MS/MSD performed on DUPLICATE 01 Dichlorodifluoromethane 132%/122% - associated samples were not detected - no qualification required 2-Hexanone RPD = 21% - associated samples were not detected - no qualification required	None
Lab Control Sample/Duplicate	Recoveries within lab limits (or 70-130%).	LCS results for target compounds were within control limits LCS 160-60374/4 LCS 160-60980/4 Chlorobenzene only LCS 160-60998/3 Chlorobenzene only All results were in control	None
Blanks	Method blanks: 1 per 12 hours. No analytes detected in MB, TB, or EB.	<u>MB 160-60374/2</u> all compounds were not detected	None
		<u>MB 160-60980/2</u> all compounds were not detected	
		<u>MB 160-60998/2</u> all compounds were not detected	
	Trip Blanks	all compounds were not detected	None
	Equipment Blanks	FB at PZ-110-SS - all compounds were not detected	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2937
FRACTION: VOA (SW846 8260C) for the Target Compound List only
MEDIA: GROUNDWATER
SAMPLES: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S): 7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
GC/MS Initial Calibration	%RSD ≤ 30%. Average RRFs > 0.050 or lab limits..	Initial Calibration <u>Instrument MSX 07/15/2013 11:23:</u> All %RSD criteria met. Average RRF meets requirements. <u>Instrument MSY 06/29/2013 10:56:</u> All %RSD criteria met.	None
GC/MS Continuing Calibration	CV performed for every 12 hours per instrument. %D ≤ 20%. RRFs ≥ 0.05	<u>CCVIS 160-60374/3 -</u> Chloroethane 22.1% - all associated samples were not detected - no qualification required <u>CCVIS 160-60980/3</u> Chloroethane 41.6% - not a target for the analysis run 2-Hexanone 29.7% - not a target for the analysis run <u>ICV 160-60754/10 -</u> results were in control RF was greater than or equal to 0.05 (or 0.01 for poor response compounds) for all target compounds	None
Internal Standards	IS areas of samples & blank within (50% to + 100%). RTs < 30 seconds.	Standard recovery area within the QC limits for all three standards; and retention times were within 30 seconds of the standard for all samples that were used in this SDG.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 01 was collected as a field dup of I-4 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 CCV = Continuing Calibration Verification; TCL = Target Compound List; TIC = Tentatively Identified Compound

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2937
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S): 7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Completeness, Holding Times & Preservation	Cooler temp < 4 C. Holding Time: Hg < 28 days, all other metals < 180 days from collection.	Coolers received at 2° C. All holding time criteria met. One sample was received unpreserved but was not identified. HNO3 was added in the laboratory; sample quality should not be affected.	None
Calibration	Calibration every 24 hours Hg $r^2 \geq 0.995$ CCV every 10 samples or 2 hours ICP CV/CCV %R = 90-110% Hg CV/CCV %R = 80-120%	Hg calibrations, ICVs, and CCVs were in control Metals ICVs and CCVs were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2937
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S): 7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
Blanks (method blank, prep blank)	CC Blank Conc < CRQL. Method blanks: 1 per 20 project samples. No TCL detected in MB, TB, or EB.	<p>Method blanks: <u>MB 160-60204/1-A (dissolved & total)</u> Zn 6.6 ug/L - qualify associated sample detects < RL as U - qualify associated sample detects > RL but < 5X blank conc X DF as J+</p> <p><u>MB 160-47518/1-A: Hg (Total)</u> - not detected</p> <p><u>MB 160-47520/1-A: Hg (dissolved)</u> - not detected</p> <p>Equipment blank: No equipment blanks associated to this SDG.</p> <p>CCBs: <u>CCB 160-60554/94 (tot)</u> As (2.5 ug/L) - qualify associated sample detects < RL as U - qualify associated sample detects > RL but < 5X blank conc X DF as J+</p> <p>Cd (1.3 ug/L) - associated samples were not detected</p> <p><u>CCB 160-60554/118 (dis & tot)</u> Cd 1.6 ug/L - qualify associated sample detects < RL as U</p> <p>Pb (1.8 ug/L) - qualify associated sample detects < RL as U</p>	<p>PZ-111-SD Zn (tot) 20U Zn (dis) 20U</p> <p>S-5 Zn (dis) 20U As (dis) 10 J+</p> <p>PZ-110-SS Zn (tot) 20U Zn (dis) 20U</p> <p>I-4 Zn (tot) 20U Zn (dis) 20U</p> <p>PZ-100-SS Zn (tot) 20U Zn (dis) 20U</p> <p>D-3 Zn (tot) 20U Zn (dis) 20U As (tot) 10U As (dis) 10U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2937
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S): 7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
		<u>Hg CCBs</u> - no detects	<p>PZ-100-SD Zn (tot) 20U Zn (dis) 21 J+ As (dis) 10U</p> <p>PZ-112-AS Zn (tot) 20U Zn (dis) 20U Pb (tot) 10 U Pb (dis) 10 U</p> <p>DUPLICATE 01 Zn (tot) 20U Zn (dis) 20U Pb (tot) 10 U Pb (dis) 10 U</p>
CRDL Standard	CRDL results btw 70-130% 50-150% for Sb, Pb, and Tl	The CRI was in control	None
Laboratory Control Sample	LCS/LCSD: 1 per 20 project samples or each preparation batch. LCS limits within 80-120%.	LCS results within limits for total and dissolved metals	None
Lab Duplicates	RPD <20% or Absolute Diff < RL when samp/dup value < 5x RL	No lab duplicates were analyzed within this SDG.	None
Matrix Spike/Matrix Spike Duplicates	MS/MSD: 1 per 20 project samples or each	MS/MSD analysis for total 6010 metals performed on PZ-110-SS - Some analytes not calculated because the sample conc was > 4X the spike conc	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LAB: TestAmerica - St. Louis
SDG: 160-2937
FRACTION: Metals (SW846 6010B and 7470A/7471A)
MEDIA: GROUNDWATER (TOTAL)
SAMPLES: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SD, D-3, PZ-100-SD, PZ-112-AS, DUPLICATE 01 (Field dup of I-4)
SAMPLE DATE(S): 7/9/2013

CRITERIA	Acceptable limits / criteria	Comments/Qualifying Actions	Qualifiers Added?
	preparation batch. Recoveries within lab limits. MS/MSD %RPDs <= 20%. Post Digestion Spike Recovery (when MS spike rec out of control) limits 75-125%	- remaining results were in control MS/MSD analysis for total mercury performed on PZ-110-SS results were in control	
ICP Interference Check Sample (ICS)	ICS results within 80-120%.	All criteria met.	None
Linear Range Check Standard	results within 90-110%	Linear range check standards were in control.	None
Serial Dilution	Performed on samples of a similar matrix or 1 per 20 samples. %D ≤ 10% conc ≥ 50xDL for 5-fold dilution.	Serial dilutions were performed on PZ-110-SS for metals and H). Results were in control.	None
Field Duplicate	Field duplicate: RPD < 35% or Absolute Diff < 5XRL when samp/dup value < 5X RL	The following field duplicates were collected with this sample set. DUP 01 was collected as a field dup of I-4 - all results were in control	None

RT = Retention Time; %D = Percent Deviation; %RPD = Relative Percent Difference; %RSD = Percent Relative Standard Deviation; RRF = Relative Response Factor;
 CCV = Continuing Calibration Verification; TCL = Target Compound List; MS = Matrix Spike; MSD = Matrix Spike Duplicate;

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Uranium-234 (0.10 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty no qualifications required - Uranium-235 (0.04) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required - Uranium-238 (0.05) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. U-234 PZ-100-KS TOT 0.05 pCi/L PZ-100-KS TOT DUP 0.02 pCi/L Both results <LLD U-235 PZ-100-KS TOT 0.05 pCi/L PZ-100-KS TOT DUP 0.04 pCi/L Both results <LLD U-238 PZ-100-KS TOT -0.02 pCi/L PZ-100-KS TOT DUP 0.05 pCi/L Both results <LLD	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">U-234 PZ-305-AI TOT U PZ-100-KS TOT U</p> <p style="text-align: center;">U-235 PZ-305-AI TOT & DIS U LR-104 DIS U PZ-100-KS TOT U PURGE TANK TOT U</p> <p style="text-align: center;">U-238 PZ-305-AI TOT & DIS U PZ-100-KS TOT & DIS U</p>
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 PZ-305-AI DIS Q PZ-100-KS DIS Q</p> <p style="text-align: center;">U-235 LR-104 TOT Q PZ-100-KS DIS Q</p> <p style="text-align: center;">U-238 LR-104 DIS Q PURGE TANK TOT Q</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	LR-104 DIS 14.7% - spectral degradation - qualify as R PZ-100-KS TOT 124% PZ-100-KS DIS 117.4% PURGE TANK TOT 23.1%	U-234, U-235, U238 LR-104 DIS R PZ-100-KS TOT J PZ-100-KS DIS J PURGE TANK TOT J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	No field duplicates were collected with this sample set	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Thorium-228 (0.01 pCi/L)-Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.04 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-232 (0.00 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 LR-104 TOT 0.06 pCi/L LR-104 TOT DUP 0.05 pCi/L Both results <LLD Th-230 LR-104 TOT 0.10 pCi/L LR-104 TOT DUP 0.12 pCi/L Range = 0.02 - results are in control Th-232 LR-104 TOT 0.01 pCi/L LR-104 TOT DUP 0.02 pCi/L Both results <LLD	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 PZ-305-AI TOT & DIS U LR-104 TOT & DIS U PZ-100-KS TOT & DIS U PURGE TANK TOT U</p> <p style="text-align: center;">Th-230 PZ-305-AI TOT & DIS U PZ-100-KS TOT U</p> <p style="text-align: center;">Th-232 PZ-305-AI TOT & DIS U LR-104 TOT & DIS U PZ-100-KS TOT & DIS U PURGE TANK TOT U</p>
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-230 LR-104 TOT & DIS Q PZ-100-KS DIS Q PURGE TANK TOT Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-305-AI TOT 57.5% LR-104 TOT 115.5% PZ-100-KS DIS 126.9%	Th-228, Th-230, Th-232 PZ-305-AI TOT J LR-104 TOT J PZ-100-KS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	No field duplicates were collected with this sample set	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.57 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. PURGE TANK TOT 3.03 pCi/L PURGE TANK TOT DUP 1.56 pCi/L Bothe results <LLD - no qualifications required	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	LR-104 DIS U PURGE TANK TOT U PZ-100-KS TOT & DIS U PZ-305-AI TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	Yes	None
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE: 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recoveries and Gravimetric recoveries were in control	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	No field duplicates were collected with this sample set	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE(S): 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank Radium-226 (0.04 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE(S): 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. PURGE TANK TOT 0.54 pCi/L PURGE TANK TOT DUP 0.67 pCi/L Range = 0.13 = <2XLLD	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-100-KS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-305-AI TOT Q LR-104 TOT & DIS Q PZ-100-KS TOT Q PURGE TANK TOT Q

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07170
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-305-AI, LR-104, PZ-100-KS, PURGE TANK (TOT only)
SAMPLE DATE(S): 7/22,23/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Yes	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	No field duplicates were collected with this sample set	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Uranium-234 (0.31 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ - Uranium-235 (0.06) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required - Uranium-238 (0.06) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required	all samples U-234 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120% ?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	<p>1. Was one duplicate sample analyzed for each batch and each method?</p> <p>2. Were duplicate results reported in pCi/L?</p> <p>3.</p> <p>a) If both results are <MDC, then no duplicate comparison was made.</p> <p>b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$.</p> <p>c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.</p>	<p>1. Yes</p> <p>2. Yes</p> <p>3.</p> <p>U-234 PZ-107-SS TOT 1.65 pCi/L PZ-107-SS TOT DUP 1.31 pCi/L RPD = 22% = qualify associated result P</p> <p>U-235 PZ-107-SS TOT 0.18 pCi/L PZ-107-SS TOT DUP 0.26 pCi/L Range = 0.08 < 2XLLD - in control</p> <p>U-238 PZ-107-SS TOT 1.42 pCi/L PZ-107-SS TOT DUP 1.44 pCi/L RPD = 1% - results are in control</p>	<p>all samples U-234 P</p>
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p>U-235 PZ-200-SS DIS U PZ-107-SS DIS U</p>
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p>U-235 PZ-107-SS FD TOT & DIS Q PZ-200-SS TOT Q PZ-107-SS TOT Q PZ-106-KS TOT & DIS Q</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	PZ-200-SS DIS 121% PZ-107-SS DIS 49.9% PZ-107-SS FD TOT 38.6% PZ-107-SS FD DIS 59.1%	U-234, U-235, U238 PZ-200-SS DIS J PZ-107-SS DIS J PZ-107-SS FD TOT J PZ-107-SS FD DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 08) was collected for PZ-107-SS - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Thorium-228 (-0.02 pCi/L) -Negative Blank Conc is <3 X blank uncertainty- no qualification required - Thorium-230 (0.08 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-232 (0.04 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. No Th-230 78.9%	all samples Th-230 S-

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 PZ-107-SS TOT 1.13 pCi/L PZ-107-SS TOT DUP 0.87 pCi/L RPD = 26 % - qualify associated results as P Th-230 PZ-107-SS TOT 1.66 pCi/L PZ-107-SS TOT DUP 1.32 pCi/L RPD = 23 % - qualify associated results as P Th-232 PZ-107-SS TOT 1.38 pCi/L PZ-107-SS TOT DUP 1.28 pCi/L RPD = 8% - results on control	all samples Th-228 P Th-230 P

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 PZ-200-SS DIS U PZ-102-SS DIS U PZ-107-SS DIS U PZ-106-KS TOT & DIS U</p> <p style="text-align: center;">Th-230 PZ-106-KS DIS U</p> <p style="text-align: center;">Th-232 PZ-200-SS DIS U PZ-102-SS DIS U PZ-107-SS FD DIS U PZ-107-SS DIS U PZ-106-KS TOT & DIS U</p>
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 PZ-107-SS DIS Q PZ-200-SS TOT Q</p> <p style="text-align: center;">Th-230 PZ-107-SS FD DIS Q PZ-200-SS DIS Q PZ-102-SS DIS Q PZ-107-SS DIS Q PZ-106-KS TOT Q</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-200-SS TOT 111% PZ-107-SS DIS 35.4% PZ-106-KS DIS 43.4% PZ-107-SS FD DIS 63.4%	Th-228, Th-230, Th-232 PZ-200-SS TOT J PZ-107-SS DIS J PZ-106-KS DIS J PZ-107-SS FD DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 08) was collected for PZ-107-SS - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected?	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.59 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. PZ-107-SS TOT 3.03 pCi/L PZ-107-SS TOT DUP 2.54 pCi/L Range = 0.49 <2XLLD - no qualifications required	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-106-KS TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	Yes	None
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recoveries: PZ-102-SS TOT 31.6% PZ-107-SS TOT 73.9% Gravimetric recoveries were in control	PZ-102-SS TOT J PZ-107-SS TOT J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE: 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 08) was collected for PZ-107-SS - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	<ol style="list-style-type: none"> All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	<ol style="list-style-type: none"> Yes Yes Yes 	None
Sample Conditions and Preservations	<ol style="list-style-type: none"> Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	<ol style="list-style-type: none"> Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	<ol style="list-style-type: none"> Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	<ol style="list-style-type: none"> Yes No Yes <p>Method blank Radium-226 (0.14 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - results were in control</p>	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. PZ-107-SS TOT 6.39 pCi/L PZ-107-SS TOT DUP 5.07 pCi/L RPD = 23% = qualify associated samples as P	all samples Ra-226 P
Non-Detects	Is the LLD > the sample concentration.	No	None
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-106-KS TOT & DIS Q

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07154
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-200-SS, PZ-102-SS, PZ-107-SS, PZ-106-KS, DUP 08 (Field dup of PZ-107-SS)
SAMPLE DATE(S): 7/19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	PZ-102-SS TOT 31.6% PZ-107-SS TOT 73.9%	PZ-102-SS TOT J PZ-107-SS TOT J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 08) was collected for PZ-107-SS - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Uranium-234 (0.27 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ - Uranium-235 (0.13) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required - Uranium-238 (0.12) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required	all samples U-234 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. U-234 PZ-206-SS TOT 0.53 pCi/L PZ-206-SS TOT DUP 0.44 pCi/L Range = 0.09 < 2XLLD - in control U-235 PZ-206-SS TOT 0.23 pCi/L PZ-206-SS TOT DUP 0.16 pCi/L Range = 0.07 < 2XLLD - in control U-238 PZ-206-SS TOT 0.49 pCi/L PZ-206-SS TOT DUP 0.21 pCi/L Range = 0.28 - qualify associated samples as P	all samples U-238 P
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234 PZ-207-AS TOT U U-235 PZ-207-AS TOT U I-73 DIS U PZ-103-AS TOT U U-238 PZ-207-AS TOT & DIS U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 PZ-207-AS DIS Q PZ-103-SS TOT Q</p> <p style="text-align: center;">U-235 PZ-104-KS TOT Q PZ-206-SS TOT & DIS Q PZ-207-AS DIS Q I-73 TOT Q PZ-103-SS DIS Q</p> <p style="text-align: center;">U-238 PZ-104-KS TOT Q PZ-206-SS DIS Q PZ-103-SS TOT & DIS Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	PZ-104-KS DIS 114.7% PZ-207-AS TOT 22.2% PZ-207-AS DIS 38.4% I-73 TOT 35.1% I-73 DIS 34.4% PZ-103-SS TOT 115.4% PZ-103-SS DIS 113.2%	U-234, U-235, U238 PZ-104-KS DIS J PZ-207-AS TOT J PZ-207-AS DIS J I-73 TOT J I-73 DIS J PZ-103-SS TOT J PZ-103-SS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 07) was collected for I-65 (SDG 13-07152) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes - Thorium-228 (0.00 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.23 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-232 (0.0 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required 3. Yes Method blank - Thorium-228 (0.01 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.20 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-232 (0.00 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 PZ-206-SS TOT 0.15 pCi/L PZ-206-SS TOT DUP 0.27 pCi/L Range = 0.12 <2XLLD - results on control Th-230 PZ-206-SS TOT 0.17 pCi/L PZ-206-SS TOT DUP 0.43 pCi/L Range = 0.26 >2XLLD - qualify associated results as P Th-232 PZ-206-SS TOT 0.10 pCi/L PZ-206-SS TOT DUP 0.16 pCi/L Range = 0.06 <2XLLD - results on control	all samples Th-230 P

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 PZ-104-KS TOT & DIS U PZ-207-AS TOT & DIS U PZ-103-SS TOT & DIS U PZ-102R-SS DIS U I-65 FD DIS U</p> <p style="text-align: center;">Th-230 PZ-103-SS DIS U</p> <p style="text-align: center;">Th-232 PZ-104-KS TOT & DIS U PZ-207-AS TOT & DIS U PZ-103-SS TOT & DIS U PZ-102R-SS DIS U I-65 FD DIS U PZ-206-SS DIS U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 I-65 FD TOT Q PZ-206-SS TOT & DIS Q I-73 DIS Q</p> <p style="text-align: center;">Th-230 I-65 FD TOT & DIS Q PZ-104-KS TOT & DIS Q PZ-206-SS TOT & DIS Q PZ-207-AS TOT & DIS Q PZ-103-SS TOT Q PZ-102R-SS DIS Q</p> <p style="text-align: center;">Th-232 I-65 TOT Q PZ-206-SS TOT Q I-73 TOT Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-104-KS DIS 63.6% PZ-206-SS TOT 124% I-65 FD TOT 56.4% I-65 FD DIS 72.3% I-73 DIS 73.4% PZ-103-SS DIS 49.8% PZ-102R-SS TOT 72.8% PZ-102R-SS DIS 70.9%	Th-228, Th-230, Th-232 PZ-104-KS DIS J PZ-206-SS TOT J I-65 FD TOT J I-65 FD DIS J I-73 DIS J PZ-103-SS DIS J PZ-102R-SS TOT J PZ-102R-SS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 07) was collected for I-65 (SDG 13-07152) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes Samples I-73 TOT and DIS contained high solids. They were prepared with EDTA, phenolphthalein, and hydroxide precipitation.	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB to I-73 TOT - Radium-228 (0.56 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required 3. Yes Method blank Run 1: - Radium-228 (0.56 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required Run 2: - Radium-228 (0.36 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Run 2: I-73 TOT 1.07 pCi/L I-73 TOT DUP 2.88 pCi/L Range = 1.81 <2XLLD - no qualifications required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-104-KS TOT & DIS U PZ-206-SS DIS U PZ-207-AS DIS U I-73 TOT & DIS U PZ-103-SS DIS U PZ-102R-SS TOT U I-65 TOT & DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	Yes	None
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recoveries were in control Gravimetric recoveries PZ-206-SS DIS 72%	PZ-206-SS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152), I-73, PZ-103-SS, PZ-102R-SS
SAMPLE DATE: 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 07) was collected for I-65 (SDG 13-07152) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152], I-73, PZ-103-SS, PZ-102R-SS)
SAMPLE DATE(S): 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes Samples I-73 TOT and DIS contained high solids and were reanalyzed due to low chemical recoveries related to the presence of a sulfate forming compound which interferes with the initial precipitation of radium as sulfate. They were prepared with EDTA, phenolphthalein, and hydroxide precipitation.	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152], I-73, PZ-103-SS, PZ-102R-SS)
SAMPLE DATE(S): 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	<p>1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent?</p> <p>2. Was at least one field blank/matrix per sampling episode collected?</p> <p>3. Were the associated blanks free of target analytes?</p>	<p>1. Yes</p> <p>2. Yes FB at I-73 TOT Radium-226 (0.05 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - results were in control</p> <p>3. Yes Method blank Run 1- Radium-226 (-0.01 pCi/L) - Negative Blank Conc is <3 X blank uncertainty - results were in control Run 2- Radium-226 (0.04 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - results were in control</p>	None
Laboratory Control Sample (LCS)	<p>1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?</p>	<p>1. Yes</p> <p>2. Yes</p>	None
Laboratory Duplicate	<p>1. Was one duplicate sample analyzed for each batch and each method?</p> <p>2. Were duplicate results reported in pCi/L?</p> <p>3.</p> <p>a) If both results are <MDC, then no duplicate comparison was made.</p> <p>b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$.</p> <p>c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.</p>	<p>1. Yes</p> <p>2. Yes</p> <p>3.</p> <p>Run 1: PZ-206-SS TOT 2.30 pCi/L PZ-206-SS TOT DUP 2.27 pCi/L RPD = 1% = results in control</p> <p>Run 2: I-73 TOT 1.90 pCi/L I-73 TOT DUP 2.20 pCi/L Range = 0.30 = results in control</p>	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152], I-73, PZ-103-SS, PZ-102R-SS)
SAMPLE DATE(S): 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-104-KS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	I-65 FD DIS Q PZ-104-KS TOT Q PZ-207-AS Q I-73 TOT & DIS Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Yes	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07153
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-104-KS, PZ-206-SS, DUP 07 (Field dup of I-65 [SDG 13-07152], I-73, PZ-103-SS, PZ-102R-SS)
SAMPLE DATE(S): 7/18,19/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 07) was collected for I-65 (SDG 13-07152) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes PZ-304-AS DIS and TOT were reanalyzed due to low chemical recoveries and disparity in the dissolved and total results.	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Uranium-234 (0.24 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ - Uranium-235 (0.09) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required - Uranium-238 (0.10) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required	all samples U-234 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. U-234 PZ-203-SS TOT 2.86 pCi/L PZ-203-SS TOT DUP 2.76 pCi/L RPD = 3.6% - in control U-235 PZ-203-SS TOT 0.22 pCi/L PZ-203-SS TOT DUP 0.26 pCi/L Range = 0.04 < 2XLLD - in control U-238 PZ-203-SS TOT 0.40 pCi/L PZ-203-SS TOT DUP 0.80 pCi/L RPD = 67% - qualify associated samples as P	all samples U-238 P
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 PZ-205-AS TOT U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 D-87 DIS Q D-14 TOTQ</p> <p style="text-align: center;">U-235 D-13 TOT & DIS Q D-14 TOT & DIS Q D-81 FD TOT Q D-87 TOT & DIS Q I-65 DIS Q PZ-203-SS TOT Q PZ-205-AS TOT & DIS Q</p> <p style="text-align: center;">U-238 D-87 DIS Q D-14 DIS Q D-13 TOT & DIS Q</p>
Standards and Reference Materials	<p>1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years.</p> <p>2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.</p>	<p>1. Yes</p> <p>2. Yes</p>	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	D-87 DIS 49% S-53 TOT 71.1% D-14 TOT 41.7% D-14 DIS 31.4% PZ-205-AS TOT 43.6% PZ-205-AS DIS 29.1% I-65 TOT 65.8%	U-234, U-235, U238 D-87 DIS J S-53 TOT J D-14 TOT J D-14 DIS J PZ-205-AS TOT J PZ-205-AS DIS J I-65 TOT J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 06) was collected for D-81 (SDG 13-07149) - results were in control 2. A field duplicate (DUP 07 - SDG 13-07153) was collected for I-65 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Thorium-228 (0.08 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.45 pCi/L) -Positive Blank Conc is >1.65 X blank uncertainty- qualify associated samples as B+ - Thorium-232 (0.17 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	all samples Th-230 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. Th-228 PZ-203-SS TOT -0.01 pCi/L PZ-203-SS TOT DUP 0.01 pCi/L Both results <LLD Th-230 PZ-203-SS TOT 0.58 pCi/L PZ-203-SS TOT DUP 0.56 pCi/L RPD = 3.5% - results are in control Th-232 PZ-203-SS TOT 0.10 pCi/L PZ-203-SS TOT DUP 0.07 pCi/L Range = 0.03 <2XLLD - results on control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 D-14 DIS U D-81 FD TOT & DIS U D-87 DIS U I-65 DIS U PZ-203-SS TOT & DIS U PZ-205-AS U S-53 DIS U</p> <p style="text-align: center;">Th-232 PZ-203-SS DIS U D-87 DIS U D-13 TOT U I-65 DIS U</p>
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 I-65 TOT Q D-13 TOT & DIS Q</p> <p style="text-align: center;">Th-230 D-81 FD TOT Q</p> <p style="text-align: center;">Th-232 D-13 DIS Q D-14 DIS Q D-81 FD TOT & DIS Q I-65 TOT Q PZ-203-SS TOT Q PZ-205-AS DIS Q S-53 DIS Q</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	D-87 DIS 71.8% D-81 FD DIS 64.5% S-53 TOT 73.3% S-53 DIS 59% I-65 TOT 70.6% I-65 DIS 74.2% D-13 TOT 62.7% D-13 DIS 64.8%	Th-228, Th-230, Th-232 D-87 DIS J D-81 FD DIS J S-53 TOT J S-53 DIS J I-65 TOT J I-65 DIS J D-13 TOT J D-13 DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 06) was collected for D-81 (SDG 13-07149) - results were in control 2. A field duplicate (DUP 07 - SDG 13-07153) was collected for I-65 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes Samples S-53 TOT and PZ-205-AS TOT contained high solids. They were prepared with EDTA, phenolphthalein, and hydroxide precipitation.	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.41 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. PZ-203-SS TOT 1.19 pCi/L PZ-203-SS TOT DUP 0.76 pCi/L Range = 0.43 <2XLLD - no qualifications required	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	D-81 FD TOT U I-65 TOT & DIS U PZ-203-SS DIS U PZ-205-AS TOT & DIS U S-53 DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	D-81 FD DIS Q PZ-203-SS TOT Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical and Gravimetric recoveries were in control	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 06) was collected for D-81 (SDG 13-07149) - results were in control 2. A field duplicate (DUP 07 - SDG 13-07153) was collected for I-65 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE(S): 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes Samples S-53 TOT and PZ-205-AS TOT contained high solids. They were prepared with EDTA, phenolphthalein, and hydroxide precipitation.	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE(S): 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Radium-226 (0.48 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+	all samples Ra-226 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. PZ-203-SS TOT 2.31 pCi/L PZ-203-SS TOT DUP 1.09 pCi/L RPD = 74% = qualify associated samples as P	all samples Ra-226 P
Non-Detects	Is the LLD > the sample concentration.	See qualifications	S-53 DIS U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07152
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-203-SS, D-87, DUP 06 (Field dup of D-81 - SDG 13-07149), S-53, D-14, PZ-205-AS, I-65, D-13
SAMPLE DATE(S): 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	D-81 TOT & DIS Q I-65 DIS Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Yes	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 06) was collected for D-81 (SDG 13-07149) - results were in control 2. A field duplicate (DUP 07 - SDG 13-07153) was collected for I-65 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes PZ-304-AS DIS and TOT were reanalyzed due to low chemical recoveries and disparity in the dissolved and total results.	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Uranium-234 (0.23 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ - Uranium-235 (0.14) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required - Uranium-238 (0.13) - Positive Blank Conc is <1.65 X blank uncertainty -- no qualifications required	all samples U-234 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. U-234 D-81 TOT 1.66 pCi/L D-81 TOT DUP 1.88 pCi/L RPD = 12% - in control U-235 D-81 TOT 0.73 pCi/L D-81 TOT DUP 0.29 pCi/L Range = 0.44 > 2XLLD - qualify associated samples as P U-238 D-81 TOT 1.39 pCi/L D-81 TOT DUP 1.30 pCi/L Range = 0.07 < 2XLLD - in control	all samples U-235 P
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 LR-100 TOT U LR-103 DIS U U-238 LR-100 TOT & DIS U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 LR-100 TOT & DIS Q LR-103 DIS Q</p> <p style="text-align: center;">U-235 LR-100 DIS Q PZ-204-SS DIS Q LR-103 TOT Q</p> <p style="text-align: center;">U-238 LR-103 DIS Q</p>
Standards and Reference Materials	<p>1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years.</p> <p>2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.</p>	<p>1. Yes</p> <p>2. Yes</p>	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-302-AS TOT 62.2% LR-100 TOT 21.5% LR-100 DIS 25.9% D-81 TOT 56.2% D-81 DIS 61.7% LR-103 TOT 38.2% LR-103 DIS 57.6% PZ-111-KS DIS 56.3%	U-234, U-235, U238 PZ-302-AS TOT J LR-100 TOT J LR-100 DIS J D-81 TOT J D-81 DIS J LR-103 TOT J LR-103 DIS J PZ-111-KS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 06) was collected for D-81 - U-235 DIS was out of control - qualify associated samples collected on 7/17 as P	U-235 LR-100 DIS P D-81 DIS P PZ-204-SS DIS P LR-103 DIS P PZ-111-KS DIS P

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Thorium-228 (0.06 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.40 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-232 (0.10 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 D-81 TOT 0.06 pCi/L D-81 TOT DUP 0.04 pCi/L Both results <LLD Th-230 D-81 TOT 0.37 pCi/L D-81 TOT DUP 0.26 pCi/L Range = 0.12 <2XLLD - results are in control Th-232 D-81 TOT 0.04 pCi/L D-81 TOT DUP 0.04 pCi/L Both results <LLD	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 D-81 TOT & DIS U LR-100 TOT & DIS U LR-103 TOT & DIS U PZ-111-KS TOT & DIS U PZ-204-SS DIS U PZ-302-AS DIS U</p> <p style="text-align: center;">Th-232 D-81 TOT & DIS U LR-100 TOT & DIS U LR-103 TOT & DIS U PZ-111-KS TOT & DIS U PZ-204-SS TOT & DIS U PZ-302-AS DIS U</p>
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 PZ-302-AS TOT Q PZ-204-SS Q</p> <p style="text-align: center;">Th-232 PZ-302-AS TOT Q</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-302-AS TOT 74.2% D-81 DIS 114.3% PZ-204-SS TOT 117.1% PZ-111-KS DIS 113.8%	Th-228, Th-230, Th-232 PZ-302-AS TOT J D-81 DIS J PZ-204-SS TOT J PZ-111-KS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 06) was collected for D-81 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.95 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. D-81 TOT 1.33 pCi/L D-81 TOT DUP 0.97 pCi/L Range = 0.36 <2XLLD - no qualifications required	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	LR-100 TOT & DIS U LR-103 TOT U PZ-111-KS TOT & DIS U PZ-204-SS TOT & DIS U PZ-302-AS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	D-81 TOT & DIS Q PZ-302-AS TOT Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE: 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recoveries PZ-302-AS DIS 73.1% Gravimetric recoveries PZ-204-SS DIS 70.9%	PZ-302-AS DIS J PZ-204-SS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 06) was collected for D-81 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE(S): 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	<ol style="list-style-type: none"> 1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package? 	<ol style="list-style-type: none"> 1. Yes 2. Yes 3. Yes 	None
Sample Conditions and Preservations	<ol style="list-style-type: none"> 1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	<ol style="list-style-type: none"> 1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	<ol style="list-style-type: none"> 1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes? 	<ol style="list-style-type: none"> 1. Yes 2. No 3. Yes <p>Method blank - Radium-226 00.02 pCi/L) - Negative Blank Conc is <3 X blank uncertainty - no qualification required</p>	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE(S): 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. D-81 TOT 0.30 pCi/L D-81 TOT DUP 0.84 pCi/L Range = 0.54 < 2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	D-81 TOT U PZ-111-KS TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	LR-100 TOT & DIS Q LR-103 TOT Q PZ-111-KS DIS Q PZ-204-SS DIS Q PZ-302-AS TOT & DIS Q

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07149
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-302-AS, LR-100, D-81, PZ-204-SS, LR-103, PZ-111-KS
SAMPLE DATE(S): 7/16,17/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	PZ-302-AS DIS 73.1%	PZ-302-AS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 06) was collected for D-81 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes PZ-304-AS DIS and TOT were reanalyzed due to low chemical recoveries and disparity in the dissolved and total results.	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank <u>Run 1:</u> - Uranium-234 (0.20 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ - Uranium-235 (0.19) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ - Uranium-238 (0.19) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ <u>Run 2:</u> - Uranium-234 (0.19 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ - Uranium-235 (0.06) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (0.09) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	all samples except PZ-304_AS TOT & DIS U-234 B+ U-235 B+ U-238 B+ PZ-304_AS TOT & DIS U-234 B+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. <u>Run 1:</u> U-234 D-12 TOT 0.58 pCi/L D-12 TOT DUP 0.67 pCi/L RPD = 14% - in control U-235 D-12 TOT 0.38 pCi/L D-12 TOT DUP 0.22 pCi/L Range = 0.16 = 2XLLD - in control U-238 D-12 TOT 0.40 pCi/L D-12 TOT DUP 0.23 pCi/L Range = 0.17 < 2XLLD - in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
		<u>Run 2:</u> U-234 PZ-304-AS TOT 0.46 pCi/L PZ-304-AS TOT DUP 0.59 pCi/L both results < LLD U-235 PZ-304-AS TOT 0.72 pCi/L PZ-304-AS TOT DUP 0.49 pCi/L both results < LLD U-238 PZ-304-AS TOT 0.45 pCi/L PZ-304-AS TOT DUP -0.17 pCi/L both results < LLD	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">U-234 PZ-304-AS TOT U</p> <p style="text-align: center;">U-235 PPZ-304-AS TOT & DIS U PZ-304-AI DIS U</p> <p style="text-align: center;">U-238 PZ-304-AS TOT & DIS U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 D-12 DIS Q PZ-304-AI TOT & DIS Q PZ-304-AS DIS Q</p> <p style="text-align: center;">U-235 D-12 DIS Q MW-104 DIS Q PZ-105-SS FD TOT & DIS Q PZ-204A-SS TOT & DIS Q PZ-208-SS TOT Q PZ-302-AI DIS Q PZ-304-AI TOT Q</p> <p style="text-align: center;">U-238 D-12 DIS Q PZ-304-AI DIS Q PZ-105-SS FD Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: D-12 DIS 54.6% PZ-105-SS TOT 67.7% PZ-304-AI TOT 35.2% PZ-304-AI DIS 34% MW-104 TOT 70.9% MW-104-DIS 71.9% PZ-204A-SS TOT 35.5% PZ-204A-SS DIS 54.8% PZ-302-AI DIS 41.8% PZ-304-AS TOT 31.6% PZ-304-AS DIS 43.2%	U-234, U-235, U238 D-12 DIS J PZ-105-SS TOT J PZ-304-AI TOT J PZ-304-AI DIS J MW-104 TOT J MW-104-DIS J PZ-204A-SS TOT J PZ-204A-SS DIS J PZ-302-AI DIS J PZ-304-AS TOT J PZ-304-AS DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 05) was collected for D-12 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Thorium-228 (0.00 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.45 pCi/L) -Positive Blank Conc is >1.65 X blank uncertainty- qualify associated sample as B+ - Thorium-232 (0.08 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	all samples Th-230 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 D-12 TOT 0.11 pCi/L D-12 TOT DUP 0.08 pCi/L Both results <LLD Th-230 D-12 TOT 0.54 pCi/L D-12 TOT DUP 0.83 pCi/L Range = 0.29 <2XLLD - results are in control Th-232 D-12 TOT 0.12 pCi/L D-12 TOT DUP 0.06 pCi/L Range = 0.06 <2XLLD - results are in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 D-12 TOT & DIS U MW-104 DIS U PZ-105-SS FD TOT & DIS U PZ-304-AS TOT & DIS U PZ-204A-SS DIS U PZ-302-AI DIS U PZ-304 AI DIS U</p> <p style="text-align: center;">Th-232 D-12 DIS U PZ-304-AI TOT & DIS U MW-104 DIS U PZ-105-SS FD DIS U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 PZ-208-SS TOT & DIS Q PZ-304-AI TOT Q PZ-204A-SS TOT Q PZ-302-AI TOT Q</p> <p style="text-align: center;">Th-230 D-12 DIS Q PZ-304-AI DIS Q PZ-204A-SS TOT Q</p> <p style="text-align: center;">Th-232 D-12 TOT Q PZ-105-SS FD TOT Q PZ-204A-SS TOT & DIS Q PZ-208-SS TOT & DIS Q PZ-302-AI TOT & DIS Q PZ-304-AS TOT & DIS Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	D-12 TOT 64.9% D-12 DIS 44% PZ-105-SS FD TOT 73.3% PZ-304-AS TOT 66.8% PZ-304-AS DIS 71.2% MW-104 DIS 73.8% PZ-204A-SS TOT 58.2%	Th-228, Th-230, Th-232 D-12 TOT J D-12 DIS J PZ-105-SS FD TOT J PZ-304-AS TOT J PZ-304-AS DIS J MW-104 DIS J PZ-204A-SS TOT J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 05) was collected for D-12 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Radium-228 (1.01 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify all samples as B+	all samples Ra-228 B+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. D-12 TOT 1.13 pCi/L D-12 TOT DUP 0.38 pCi/L both samples <LLD	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	MW-104 DIS U D-12 TOT U PZ-105-SS FD TOT U PZ-204A-SS TOT U PZ-208-SS DIS U PZ-302-AI TOT & DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	MW-104 TOT Q PZ-204A-SS DIS Q PZ-105-SS FD DIS Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE: 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	All Chemical recoveries and Gravimetric recoveries were in control	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 05) was collected for D-12 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE(S): 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Radium-226 (0.04 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE(S): 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. D-12 TOT 0.29 pCi/L D-12 TOT DUP 0.12 pCi/L Range = 0.17 <2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	MW-104 DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	D-12 TOT & DIS Q PZ-208-SS DIS Q PZ-302-AI DIS Q PZ-105-SS FD TOT & DIS Q

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07147
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: D-12, DUP05 (Field dup of PZ-105-SS), PZ-208-SS, PZ-304-AI, PZ-304-AS, MW-104, PZ-204A-SS, PZ-302-AI
SAMPLE DATE(S): 7/15,16/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	<p>1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years.</p> <p>2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.</p>	<p>1. Yes</p> <p>2. Yes</p>	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	All chemical recoveries were in control	None
Background Counts	<p>1. Background was measured</p> <p>2. Background counts duration was at least as long as the sample count duration</p>	<p>1. Yes</p> <p>2. Yes</p>	None
Field Duplicate	<p>1. Were field duplicates collected for every 10 samples?</p> <p>2. a) If both results are <MDC, then no duplicate comparison was made.</p> <p>b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%.</p> <p>c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.</p>	1. A field duplicate (DUP 05) was collected for D-12 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB AT D-12 TOT - Uranium-234 (0.32 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify sample as P - Uranium-235 (0.04) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (0.04) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 3. Yes Method blank - Uranium-234 (0.08 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-235 (0.08) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (0.03) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	D-12 TOT U-234 P
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. U-234 PZ-105-SS TOT 2.81 pCi/L PZ-105-SS TOT DUP 3.12 pCi/L RPD = 10% - in control U-235 PZ-105-SS TOT 0.25 pCi/L PZ-105-SS TOT DUP 0.51 pCi/L Range = 0.26 > 2XLLD - qualify associated samples as P U-238 PZ-105-SS TOT 1.54 pCi/L PZ-105-SS TOT DUP 1.63 pCi/L RPD = 2% - in control	all samples U-235 B+
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 PZ-114-AS TOT U U-238 PZ-114-AS TOT U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 PZ-114-AS TOT & DIS Q S-10 DIS Q</p> <p style="text-align: center;">U-235 PZ-303-AS TOT & DIS Q I-11 TOT & DIS Q S-10 TOT & DIS Q PZ-114-AS DIS Q I-66 TOT & DIS Q PZ-105-SS TOT Q</p> <p style="text-align: center;">U-238 PX-303-AS TOT Q S-10 DIS Q PZ-114-AS DIS Q I-66 DIS Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-114-AS TOT 44% PZ-114-AS DIS 66.2% I-66 DIS 42.4% PZ-303-AS TOT 52.6% PZ-303-AS DIS 60.1% S-10 TOT 61.9% S-10 DIS 52.4%	U-234, U-235, U238 PZ-114-AS TOT J PZ-114-AS DIS J I-66 DIS J PZ-303-AS TOT J PZ-303-AS DIS J S-10 TOT J S-10 DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB AT D-12 TOT - Thorium-228 (-0.08 pCi/L) -Negative Blank Conc is <3X blank uncertainty- no qualification required - Thorium-230 (0.46 pCi/L) -Positive Blank Conc is >1.65 X blank uncertainty- qualify associated sample as B+ - Thorium-232 (0.12 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required 3. No Method blank - Thorium-228 (-0.02 pCi/L) -Negative Blank Conc is <3X blank uncertainty- no qualification required - Thorium-230 (0.58 pCi/L) -Positive Blank Conc is >1.65 X blank uncertainty- qualify associated sample as B+ - Thorium-232 (0.03 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification	D-12 TOT Th-230 B+ all samples Th-230 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 PZ-105-SS TOT -0.03 pCi/L PZ-105-SS TOT DUP 0.06 pCi/L Both results <LLD Th-230 PZ-105-SS TOT 0.45 pCi/L PZ-105-SS TOT DUP 0.56 pCi/L Range = 0.11 <2XLLD - results are in control Th-232 PZ-105-SS TOT 0.06 pCi/L PZ-105-SS TOT DUP 0.11 pCi/L Both results <LLD	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 MW102 DIS U MW-103 DIS U PZ-105-SS TOT & DIS U PZ-114-AS TOT & DIS U PZ-303-AS TOT & DIS U S-10 TOT & DIS U</p> <p style="text-align: center;">Th-232 I-66 DIS U MW-102 TOT U MW-103 DIS U PZ-105-SS TOT U PZ-114-AS TOT & DIS U PZ-303-AS DIS U S-10 DIS U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 I-11 TOT Q I-66 TOT Q</p> <p style="text-align: center;">Th-230 S-10 TOT Q PZ-114-AS TOT & DIS Q I-66 DIS Q MW-102 TOT & DIS Q MW-103 DIS Q</p> <p style="text-align: center;">Th-232 MW-102 DIS Q PZ-105-SS DIS Q PZ-303-AS TOT Q S-10 TOT Q</p>
Standards and Reference Materials	<p>1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years.</p> <p>2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.</p>	<p>1. Yes</p> <p>2. Yes</p>	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-114-AS TOT 37.5% I-66 TOT 50.3% I-66 DIS 65.2% MW-102 TOT 54.4% MW-102 DIS 43.3% MW-103 TOT 70.3% MW-103 DIS 67.8% I-11 TOT 71.1% I-11 DIS 50.4%	Th-228, Th-230, Th-232 PZ-114-AS TOT J I-66 TOT J I-66 DIS J MW-102 TOT J MW-102 DIS J MW-103 TOT J MW-103 DIS J I-11 TOT J I-11 DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB AT D-12 TOT - Radium-228 (1.20 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required 3. Yes Method blank - Radium-228 (0.73 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. PZ-105-SS TOT 0.92 pCi/L PZ-105-SS TOT DUP 1.61 pCi/L Range = 0.69 <2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	I-66 DIS U MW-103 DIS U PZ-105 SS TOT U PZ-114-AS TOT & DIS U PZ-303-AS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-303-AS TOT Q S-10 DIS Q MW-102 TOT & DIS Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE: 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	All Chemical recoveries and Gravimetric recoveries were in control	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE(S): 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB AT D-12 TOT - Radium-226 (0.02 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 3. Yes Method blank - Radium-226 (0.07 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE(S): 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. PZ-105-SS TOT 1.54 pCi/L PZ-105-SS DUP 1.77 pCi/L RPD = 14% - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	MW-103 DIS U PZ-114-AS DIS U S-10 DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	I-66 TOT & DIS Q MW-102 DIS Q MW-103 TOT Q PZ-114-AS TOT Q PZ-303-AS DIS Q S-10 TOT Q

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07146
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-105-SS, PZ-114-AS, I-66, MW-102, MW-103, PZ-303-AS, I-11, S-10
SAMPLE DATE(S): 7/12,15/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	All chemical recoveries were in control	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	No field duplicates were collected with this sample set.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Uranium-234 (0.39 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-235 (0.08) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (0.09) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120% ?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. U-234 I-67 TOT 0.89 pCi/L I-67 TOT DUP 0.84 pCi/L RPD = 5.8% - in control U-235 I-67 TOT 0.22 pCi/L I-67 TOT DUP 0.14 pCi/L Range = 0.08 < 2XLLD - in control U-238 I-67 TOT 0.56 pCi/L I-67 TOT DUP 0.54 pCi/L Range = 0.02 < 2XLLD - in control	None
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-235 D-6 TOT & DIS U I-62 FD TOT U D-83 FD TOT & DIS U U-238 D-6 TOT U D-83 FD DIS U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 D-6 TOT & DIS U I-62 FD TOT Q D-83 FD TOT & DIS Q</p> <p style="text-align: center;">U-235 D-83 DIS Q I-62 TOT & DIS Q I-67 TOT & DIS Q I-68 DIS Q S-61 TOT & DIS Q S-8 TOT & DIS Q</p> <p style="text-align: center;">U-238 I-62 TOT & DIS Q D-6 DIS Q I-62 FD TOT Q D-83 FD TOT Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-113-AS FD TOT 57.1% PZ-113-AS FD DIS 26.2% S-8 TOT 61.1% I-62 DIS 72.4% D-6 TOT 63.4% D-6 DIS 64.9% S-61 DIS 47.3% I-67 TOT 55.7% I-67 DIS 70.3% I-68 TOT 61.8% D-83 FD TOT 58.6% D-83 FD DIS 71.9%	U-234, U-235, U238 D-83 FD TOT J D-83S FD DIS J S-8 TOT J I-62 DIS J D-6 TOT J D-6 DIS J S-61 DIS J I-67 TOT J I-67 DIS J I-68 TOT J I-62 FD TOT J I-62 FD DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 04) was collected for I-62 - results were in control 2. DUP 03 was collected as a field duplicate for D-83 (SDG 13-07110) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Thorium-228 (-0.04 pCi/L) -Negative Blank Conc is <3X blank uncertainty- no qualification required - Thorium-230 (0.43 pCi/L) -Positive Blank Conc is >1.65 X blank uncertainty- qualify associated sample as B+ - Thorium-232 (0.01 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	all samples Th-230 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 I-67 TOT 0.03 pCi/L I-67 TOT DUP 0.0 pCi/L Both results <LLD Th-230 I-67 TOT 0.87 pCi/L I-67 TOT DUP 0.46 pCi/L Range = 0.41 >2XLLD - qualify associated results as P Th-232 I-67 TOT 0.06 pCi/L I-67 TOT DUP 0.05 pCi/L Both results <LLD	all samples Th-230 P

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 I-62 FD TOT & DIS U I-62 TOT & DIS U I-67 TOT & DIS U S-8 TOT & DIS U S-61 DIS U I-68 DIS U</p> <p style="text-align: center;">Th-232 D-6 DIS U I-62 FD TOT U D-83 FD TOT & DIS U I-62 DIS U I-67 TOT U I-68 DIS U S-61 DIS U S-8 TOT & DIS U</p>
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 D-6 TOT & DIS Q D-83 FD TOT & DIS Q</p> <p style="text-align: center;">Th-230 S-8 DIS Q I-68 DIS Q</p> <p style="text-align: center;">Th-232 I-62 TOT Q D-6 TOT Q I-62 FD DIS Q I-67 DIS Q</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	D-6 DIS 44.3% S-61 DIS 62.1% I-67 TOT 60.5% D-83 FD DIS 119%	Th-228, Th-230, Th-232 D-6 DIS J S-61 DIS J I-67 TOT J I-62 FD DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 04) was collected for I-62 - results were in control 2. DUP 03 was collected as a field duplicate for D-83 (SDG 13-07110) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.28 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. I-67 TOT 1.19 pCi/L I-67 DUP 1.22 pCi/L Both results <LLD	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	S-8 TOT & DIS U I-62 DIS U I-62 FD DIS U I-67 TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	I-62 TOT Q S-61 TOT Q I-67 DIS Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE: 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	All Chemical recoveries and Gravimetric recoveries were in control	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 04) was collected for I-62 - results were in control 2. DUP 03 was collected as a field duplicate for D-83 (SDG 13-07110) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE(S): 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	<ol style="list-style-type: none"> 1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package? 	<ol style="list-style-type: none"> 1. Yes 2. Yes 3. Yes 	None
Sample Conditions and Preservations	<ol style="list-style-type: none"> 1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 min)	Yes	None
Matrix Spike/Matrix Spike Duplicates	<ol style="list-style-type: none"> 1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	<ol style="list-style-type: none"> 1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes? 	<ol style="list-style-type: none"> 1. Yes 2. No 3. Yes <p>Method blank - Radium-226 (-0.07 pCi/L) - Negative Blank Conc is <3 X blank uncertainty - no qualification required</p>	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE(S): 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. I-67 TOT 0.49 pCi/L I-67 DUP 0.46 pCi/L Range = 0.03 < 2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	I-62 FD DIS U S-8 TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	I-62 FD TOT Q I-62 TOT & DIS Q I-67 TOT & DIS Q I-68 DIS Q S-61 DIS Q S-8 DIS Q

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07111
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: DUP 03 (Field dup of D-83), S-8, I-62, D-6, S-61, I-67, I-68, DUP 04 (Field dup of I-62)
SAMPLE DATE(S): 7/11, 12/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	All chemical recoveries were in control	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 04) was collected for I-62 - results were in control 2. DUP 03 was collected as a field duplicate for D-83 (SDG 13-071110) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes MW-1204 DIS was reanalyzed due to low chemical recovery. For PZ-202-SS TOT, PZ-116-SS TOT, PZ-116-SS DIS, PZ-115-SS TOT & PZ115-SS DIS, the U-235 results appear to be biased positive due to spectral trailing of U-234 into the U-235 region of interest.	PZ-202-SS TOT U-235 J+ PZ-116-SS TOT U-235 J+ PZ-116-SS DIS U-235 J+ PZ-115-SS TOT U-235 J+ PZ115-SS DIS U-235 J+
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB at PZ-202-SS TOT - Uranium-234 (0.19 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated sample as B+ - Uranium-235 (0.06) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (0.05) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 3. No Method blank <u>Run 1:</u> - Uranium-234 (0.08 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-235 (0.08) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	PZ-202-SS TOT U-234 B+ MW-1204 DIS U-234 B+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
		- Uranium-238 (0.07) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required <u>Run 2 (MW-1204 DIS):</u> - Uranium-234 (0.32 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated samples as B+ - Uranium-235 (0.11) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (-0.01) -Negative Blank Conc is <3 X blank uncertainty - no qualification required	
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120% ?	1. Yes 2. No Run 2: U-234 LCS = 78.1%	MW-1204 DIS U-234 S+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. <u>Run 1:</u> U-234 D-83 TOT 0.12 pCi/L D-83 TOT DUP 0.27 pCi/L Range = 0.15 <2XLLD - in control U-235 D-83 TOT 0.03 pCi/L D-83 TOT DUP 0.05 pCi/L Both results < LLD U-238 D-83 TOT 0.12 pCi/L D-83 TOT DUP 0.03 pCi/L Both results < LLD	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
		<u>Run 2:</u> U-234 MW-1204 DIS 0.12 pCi/L MW-1204 DIS DUP 0.18 pCi/L Both results < LLD U-235 MW-1204 DIS 0.03 pCi/L MW-1204 DIS DUP 0.21 pCi/L Both results < LLD U-238 MW-1204 DIS 0.12 pCi/L MW-1204 DIS DUP 0.02 pCi/L Both results < LLD	
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">U-234 D-83 TOT U MW-1204 DIS U</p> <p style="text-align: center;">U-235 D-83 TOT & DISU D-93 TOT & DIS U I-9TOT & DIS U MW-1204 DIS U S-82 DIS U</p> <p style="text-align: center;">U-238 MW-1204 TOT & DIS U D-83 TOT & DIS U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 D-83 DIS Q D-93 TOT & DIS Q I-9 DIS Q MW-1204 TOT Q S-82 DIS Q</p> <p style="text-align: center;">U-235 PZ-115-SS TOT & DIS Q PZ-202-SS TOT & DIS Q S-82 TOT Q</p> <p style="text-align: center;">U-238 D-93 TOT & DIS Q I-9 TOT & DIS Q S-82 TOT & DIS Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-202-SS DIS 58.8% D-83 TOT 44.9% D-83 DIS 63.8% MW-1204 TOT 35.4% MW-1204 DIS (Run 2) 62.6% S-82 TOT 66.5% S-82 DIS 52.2% PZ-116-SS DIS 126.6% I-9 TOT 66.9% I-9 DIS 57.2% PZ-115-SS TOT 73.8%	U-234, U-235, U238 PZ-202-SS DIS J D-83 TOT J D-83 DIS J MW-1204 TOT J MW-1204 DIS (Run 2) J S-82 TOT J S-82 DIS J PZ-116-SS DIS J I-9 TOT J I-9 DIS J PZ-115-SS TOT J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 03) was collected for I-62 in SDG 13-07111 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB at PZ-202-SS TOT - Thorium-228 (-0.01 pCi/L) - Negative Blank Conc is <3 X blank uncertainty- no qualification required - Thorium-230 (0.22 pCi/L) -Positive Blank Conc is >1.65 X blank uncertainty- qualify associated sample as B+ - Thorium-232 (0.04 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required 3. No Method blank - Thorium-228 (0.09 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.23 pCi/L) -Positive Blank Conc is >1.65 X blank uncertainty- qualify associated sample as B+ - Thorium-232 (0.05 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	PZ-202-SS TOT Th-230 B+ all samples Th-230 B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 D-83 TOT 0.14 pCi/L D-83 TOT DUP 0.16 pCi/L Range = 0.02 <2XLLD - results are in control Th-230 D-83 TOT 0.14 pCi/L D-83 TOT DUP 0.19 pCi/L Range = 0.05 <2XLLD - results are in control Th-232 D-83 TOT 0.06 pCi/L D-83 TOT DUP 0.06 pCi/L Range = 0.00 <2XLLD - results are in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228</p> <p style="text-align: center;">I-9 TOT & DIS U D-93 DIS U MW-1204 TOT & DIS U PZ-115-SS TOT & DIS U PZ-116-SS TOT & DIS U PZ-202-SS TOT & DIS U S-82 TOT U</p> <p style="text-align: center;">Th-232</p> <p style="text-align: center;">D-83 TOT & DIS U I-9 TOT & DIS U D-93 TOT & DIS U MW-1204 TOT & DIS U PZ-115-SS TOT & DIS U PZ-116-SS TOT & DIS U PZ-202-SS TOT & DIS U S-82 TOT & DIS U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 D-83 TOT & DIS Q S-82 DIS Q D-93 TOT Q</p> <p style="text-align: center;">Th-230 D-83 TOT & DIS Q I-9 TOT & DIS Q D-93 TOT & DIS Q MW-1204 TOT Q PZ-115-SS TOT & DIS Q PZ-116-SS TOT & DIS Q PZ-202-SS TOT & DIS Q S-82 TOT Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-202-SS TOT 71.0% PZ-202-SS DIS 68.2% D-83 DIS 127.8% S-82 TOT 115.5% S-82 DIS 114.8%	<p style="text-align: center;">Th-228, Th-230, Th-232 PZ-202-SS TOT J PZ-202-SS DIS J D-83 DIS J S-82 TOT J S-82 DIS J</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 03) was collected for I-62 in SDG 13-07111 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB at PZ-202-SS TOT - Radium-228 (1.16 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify associated sample as B+ 3. Yes Method blank - Radium-228 (0.59 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	PZ-202-SS TOT Ra-228 B+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. No LCS = 134.9% - qualify associated samples as S+	All samples Ra-228 S+
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. D-83 TOT 4.30 pCi/L D-83 DUP 7.42 pCi/L Range = 3.12 <2XLLD results are in control	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	D-93 TOT U PZ-115-SS DIS U PZ-116-SS TOT U PZ-202-SS TOT U S-82 TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	Yes	None
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE: 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recoveries: PZ-115-SS TOT 111% Gravimetric recoveries were in control	PZ-115-SS TOT Ra-228 J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 03) was collected for I-62 in SDG 13-07111 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE(S): 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	<ol style="list-style-type: none"> All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	<ol style="list-style-type: none"> Yes Yes Yes 	None
Sample Conditions and Preservations	<ol style="list-style-type: none"> Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 min)	Yes	None
Matrix Spike/Matrix Spike Duplicates	<ol style="list-style-type: none"> Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None
Method and Field Blanks	<ol style="list-style-type: none"> Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? Was at least one field blank/matrix per sampling episode collected? Were the associated blanks free of target analytes? 	<ol style="list-style-type: none"> Yes Yes FB at PZ-202-SS TOT - Radium-226 (0.00 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required Yes Method blank - Radium-226 (0.05 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE(S): 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. D-83 TOT 3.04 pCi/L D-83 DUP 2.48 pCi/L RPD = 20%	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-116-SS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-116-SS TOT Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	PZ-115-SS TOT 111%	PZ-115-SS TOT J

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07110
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-202-SS, D-83, MW1204, S-82, PZ-116-SS, D-93, I-9, PZ-115-SS
SAMPLE DATE(S): 7/11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. A field duplicate (DUP 03) was collected for I-62 in SDG 13-07111 - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Uranium-234 (0.16 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-235 (0.03) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (0.09) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Was LCS % RSD < 10%?	1. Yes 2. Yes	No

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. U-234 PZ-113-AS TOT 0.69 pCi/L PZ-113-AS TOT DUP 0.63 pCi/L Range = 0.06 <2XLLD - in control U-235 PZ-113-AS TOT 0.14 pCi/L PZ-113-AS TOT DUP 0.07 pCi/L Range = 0.07 <2XLLD - in control U-238 PZ-113-AS TOT 0.62 pCi/L PZ-113-AS TOT DUP 0.38 pCi/L Range = 0.24 <2XLLD - in control	None
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234 DUP 02 TOT U PZ-104-SD TOT & DIS U U-235 DUP 02 TOT & DISU PZ-104-SD TOT & DIS U PZ-101-SS TOT & DIS U PZ-104 SS DIS U U-238 DUP 02 TOT U PZ-104-SD TOT & DIS U PZ-101-SS TOT U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 DUP 02 DIS Q PZ-101-SS TOT Q</p> <p style="text-align: center;">U-235 PZ-104-SS TOT Q PZ-109-SS TOT & DIS Q PZ-113-AS TOT & DIS Q PZ-113-SS TOT & DIS Q PZ-205-SS TOT & DIS Q</p> <p style="text-align: center;">U-238 DUP 02 DIS Q PZ-104-SS DIS Q PZ-113-AS DIS Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	Qualify the following results as J: PZ-113-AS TOT 64% PZ-109-SS DIS 112.4% PZ-205-SS TOT 115% DUP 02 TOT 23.2% DUP 02 DIS 22.9% PZ-113-SS DIS 111.7% PZ-101-SS TOT 20.2% PZ-101 SS DIS 55.8% PZ-104-SD TOT 22.6% PZ-104-SD DIS 26.3%	U-234, U-235, U238 PZ-113-AS TOT J PZ-109-SS DIS J PZ-205-SS TOT J DUP 02 TOT J DUP 02 DIS J PZ-113-SS DIS J PZ-101-SS TOT J PZ-101 SS DIS J PZ-104-SD TOT J PZ-104-SD DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 02 was collected as a field duplicate of PZ-113-AD (SDG 13-7099) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Thorium-228 (0.01 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.11 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-232 (0.02 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Th-232 - 124.45% - qualify associated samples as S+	Th-232 all samples S+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 PZ-113-AS TOT 0.06 pCi/L PZ-113-AS TOT DUP 0.07 pCi/L Range = 0.01 <2XLLD - results are in control Th-230 PZ-113-AS TOT 0.21 pCi/L PZ-113-AS TOT DUP 0.23 pCi/L Range = 0.02 <2XLLD - results are in control Th-232 PZ-113-AS TOT 0.12 pCi/L PZ-113-AS TOT DUP 0.02 pCi/L Range = 0.10 <2XLLD - results are in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 DUP 02 DIS U PZ-101-SS TOT & DIS U PZ-104-SD TOT & DIS U PZ-109-SS TOT & DIS U PZ-113-AS TOT U PZ-113-SS DIS U PZ-205-SS TOT & DIS U</p> <p style="text-align: center;">Th-230 PZ-205-SS TOT U PZ-109-SS TOT U PZ-104-SS DIS U PZ-104-SD TOT U</p> <p style="text-align: center;">Th-232 DUP 02 TOT & DIS U PZ-101-SS TOT & DIS U PZ-104-SD TOT U PZ-104-SS TOT & DIS U PZ-109-SS TOT & DIS U PZ-113-AS TOT & DIS U PZ-113-SS DIS U PZ-205-SS TOT U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 DUP 02 TOT Q PZ-113-AS TOT & DIS Q PZ-113-SS TOT Q</p> <p style="text-align: center;">Th-230 PZ-101-SS TOT & DIS Q PZ-104-SD DIS Q PZ-104-SS TOT Q PZ-109-SS DIS Q PZ-113-AS TOT & DIS Q PZ-205-SS DIS Q</p> <p style="text-align: center;">Th-232 PZ-104-SD DIS Q PZ-113-AS TOT Q PZ-113-SS TOT Q PZ-205-SS DIS Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% check for spectral degradation.	PZ-113-AS DIS 131.3% DUP 02 DIS 117.4% PZ-113-SS TOT 125% PZ-104-SS TOT 114.4% PZ-104-SD TOT 67.7%	Th-228, Th-230, Th-232 PZ-113-AS DIS J DUP 02 DIS J PZ-113-SS TOT J PZ-104-SS TOT J PZ-104-SD TOT J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 02 was collected as a field duplicate of PZ-113-AD (SDG 13-7099) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Radium-228 (0.20 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualifications required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. PZ-113-AS TOT 0.53 pCi/L PZ-113-AS DUP 0.68 pCi/L Both results <LLD	None
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-113-AS TOT & DIS U PZ-104-SS TOT & DIS U PZ-205-SS DIS U PZ-113-SS TOT U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-205-SS TOT Q PZ-109-SS TOT Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE: 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical and gravimetric recoveries were in control	None
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 02 was collected as a field duplicate of PZ-113-AD (SDG 13-7099) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE(S): 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 min)	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Radium-226 (-0.03 pCi/L) - Negative Blank Conc is <3 X blank uncertainty - no qualification required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE(S): 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. PZ-113=AS TOT 0.65 pCi/L PZ-113=AS DUP 0.66 pCi/L Range = 0.01 <2XLLD - results are in control	None
Non-Detects	Is the LLD > the sample concentration.	Yes	None
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-113-AS TOT & DIS Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07100
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-113-AS, PZ-109-SS, PZ-205-SS, DUP 02 (Field duplicate of D-85), PZ-113-SS, PZ-104-SS, PZ-101-SS, PZ-104-SD
SAMPLE DATE(S): 7/10,11/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 02 was collected as a field duplicate of PZ-113-AD (SDG 137099) - results were in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes All samples were reanalyzed due to low chemical recovery. The second analysis also produced low chemical recoveries due to apparent chemical interferences.	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Uranium-234 (0.33 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify all samples as B+ - Uranium-235 (0.08) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (0.08) -Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	U-234 all samples B+
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Was LCS % RSD < 10%?	1. Yes 2. Yes	No

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. U-234 D-85 TOT 2.95 pCi/L D-85 TOT DUP 2.57 pCi/L Range = 0.38 <2XLLD - in control U-235 D-85 TOT 1.31 pCi/L D-85 TOT DUP 0.64 pCi/L Range = 0.67 <2XLLD - in control U-238 D-85 TOT 2.39 pCi/L D-85 TOT DUP 2.37 pCi/L Range = 0.02 <2XLLD - in control	None
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	U-234 DUP 01 TOT & DIS U U-235 DUP 01 TOT & DIS U U-238 DUP 01 TOT & DIS U

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 PZ-113-AD TOT & DIS Q S-84 TOT & DIS Q</p> <p style="text-align: center;">U-235 D-85 TOT Q PZ-106-SD TOT & DIS Q PZ-106-SS DIS Q PZ-201A-SS TOT Q S-84 DIS Q</p> <p style="text-align: center;">U-238 PZ-106-SD TOT Q PZ-106-SS TOT Q S-84 TOT Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%). If chemical recoveries were <20% then check for spectral degradation.	DUP 01 TOT 15.7% DUP 01 DIS 10.8% PZ-113-AD TOT 10.9% - spectral degradation - qualify associated results as R Qualify the following results as J: PZ-201A-SS TOT 53.5% PZ-201A-SS DIS 61.2% D-85 TOT 26.2% D-85 DIS 58.9% PZ-106-SD TOT 52.4% PZ-106-SD DIS 61.2% S-84 TOT 33.2% S-84 DIS 22.9% PZ-106-SS TOT 54% PZ-106-SS DIS 60.9% PZ-113-AD DIS 52.7%	U-234, U-235, U238 DUP 01 TOT R DUP 01 DIS R PZ-113-AD TOT R PZ-201A-SS TOT J PZ-201A-SS DIS J D-85 TOT J D-85 DIS J PZ-106-SD TOT J PZ-106-SD DIS J S-84 TOT J S-84 DIS J PZ-106-SS TOT J PZ-106-SS DIS J PZ-113-AD DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 01 was collected as a field duplicate of I-4 - results were in control. 2. A field dup of PZ-113-AD was collected in SDG 13-07100 - results were in control.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Thorium-228 (0.03 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.13 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-232 (0.07 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120% ?	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 D-85 TOT 2.68 pCi/L D-85 TOT DUP 2.48 pCi/L Range = 0.2 <2XLLD - results are in control Th-230 D-85 TOT 4.26 pCi/L D-85 TOT DUP 4.31 pCi/L Range = 0.05 <2XLLD - results are in control Th-232 D-85 TOT 2.50 pCi/L D-85 TOT DUP 2.29 pCi/L Range = 0.21 <2XLLD - results are in control	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228 D-85 DIS U DUP 01 TOT & DIS U PZ-106-SD TOT & DIS U PZ-106-SS TOT & DIS U PZ-113-AD DIS U PZ-201A-SS TOT & DIS U</p> <p style="text-align: center;">Th-230 D-85 DIS U PZ-106-SD DIS U PZ-106-SS TOT U</p> <p style="text-align: center;">Th-232 D-85 DIS U DUP 01 TOT & DIS U PZ-106-SD DIS U PZ-106-SS TOT & DIS U PZ-113-AD TOT & DIS U PZ-201A-SS TOT & DIS U S-84 DIS U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 PZ-113-AD TOT Q S-84 DIS Q</p> <p style="text-align: center;">Th-230 DUP 01 TOT & DIS Q PZ-106-SD TOT Q PZ-106-SS DIS Q PZ-113-AD TOT & DIS Q PZ-201A-SS TOT & DIS Q S-84 DIS Q</p> <p style="text-align: center;">Th-232 PZ-106-SD TOT Q</p>
Standards and Reference Materials	<p>1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years.</p> <p>2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.</p>	<p>1. Yes</p> <p>2. Yes</p>	None
Chemical Yield (Tracer)	<p>Chemical recoveries were within control limits (75-110%).</p> <p>If chemical recoveries were <20% check for spectral degradation.</p>	<p>DUP 01 DIS 71.4%</p> <p>D-85 TOT 56.6%</p> <p>S-84 TOT 59.3%</p> <p>S-84 DIS 122.7%</p> <p>PZ-106-SS TOT 71.3%</p>	<p style="text-align: center;">Th-228, Th-230, Th-232 DUP 01 DIS J D-85 TOT J S-84 TOT J S-84 DIS J PZ-106-SS TOT J</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 01 was collected as a field duplicate of I-4 - results were in control. 2. A field dup of PZ-113-AD was collected in SDG 13-07100 - results were in control.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE(S): 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 min)	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. Yes Method blank - Radium-226 (0.10 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE(S): 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. D-85 TOT 4.64 pCi/L D-85 TOT DUP 6.23 pCi/L RPD = 29% -qualify associated samples as P	all samples P
Non-Detects	Is the LLD $>$ the sample concentration.	Yes	None
Uncertainty	For the sample results $>$ LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-106-SD DIS Q PZ-201A-SS TOT & DIS Q S-84 DIS Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE(S): 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Chemical recovery: D-85 TOT 34.6%	D-85 TOT J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 01 was collected as a field duplicate of I-4 - results were in control. 2. A field dup of PZ-113-AD was collected in SDG 13-07100 - results were in control.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. No 3. No Method blank - Radium-228 (0.90 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify samples as B+	All samples Ra-228 B+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. D-85 TOT 4.91 pCi/L D-85TOT DUP 6.34 pCi/L Range = 1.43 >2XLLD - qualify all samples as P	All samples Ra-228 P
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-201A-SS TOT & DIS U PZ-106-SS TOT & DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-106-SD TOT Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Chemical recovery: D-85 TOT 34.6%	D-85 TOT J

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07099
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: DUP 01 (Field duplicate of I-4), PZ-201A-SS, D-85, PZ-106-SD, S-84, PZ-106-SS, PZ-113-AD
SAMPLE DATE: 7/9,10/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 01 was collected as a field duplicate of I-4 - results were in control. 2. A field dup of PZ-113-AD was collected in SDG 13-07100 - results were in control.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	<ol style="list-style-type: none"> All results forms and Case Narrative included? All samples in COC present? All notes in Case Narrative consistent with chemist's review of data package? 	<ol style="list-style-type: none"> Yes Yes Yes <p>S-5 TOT, I-4 TOT AND I-4 DIS were reanalyzed due to low chemical recovery. The second analysis also produced low chemical recoveries due to apparent chemical interferences.</p>	None
Sample Conditions and Preservations	<ol style="list-style-type: none"> Cooler temperature <6°C? pH of aqueous samples <2? Record of sample preservation and problems noted for sample conditions. 	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 minutes)	Yes	None
Matrix Spike/Matrix Spike Duplicates	<ol style="list-style-type: none"> Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? Were field blanks used for MS/MSD sample analysis? Were spike recovery and RPD results reported in pCi/L? Were MS/MSD results within lab established control limits? Were RPD ≤ 20%? 	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB at PZ-110-SS TOT - U-234 (0.05 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty no qualification required - U-235 (0.04 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty no qualification required - U-238 (0.13 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty no qualification required 3. Yes Method blank - Uranium-234 (0.13 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-235 (0.04 and 0.06 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required - Uranium-238 (0.06 and 0.08 pCi/L) -Positive	None
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120% ?	1. Yes 2. Yes	No

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. U-234 I-4 TOT 0.60 pCi/L I-4 TOT DUP 0.20 pCi/L Range = 0.40 <2XLLD - in control U-235 I-4 TOT 0.32 pCi/L I-4 TOT DUP 0.27 pCi/L both results <LLD U-238 I-4 TOT 0.17 pCi/L I-4 TOT DUP -0.09 pCi/L both results <LLD	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">U-234 PZ-110-SS TOT & DIS U S-5 DIS U D-3 TOT U</p> <p style="text-align: center;">U-235 D-3 TOT & DIS U I-4 TOT & DIS U PZ-100-SD TOT & DIS U PZ-110-SS DIS U PZ-111-SD TOT & DIS U PZ-112-AS TOT & DIS U S-5 TOT & DIS U</p> <p style="text-align: center;">U-238 D-3 TOT & DIS U I-4 TOT & DIS U PZ-110-SS TOT & DIS U PZ-112-AS TOT & DIS U S-5 TOT U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications	<p style="text-align: center;">U-234 D-3 DIS Q PZ-112-AS TOT & DIS Q I-4 TOT & DIS Q S-5 TOT Q</p> <p style="text-align: center;">U-235 PZ-110-SS TOT Q PZ-100-SS DIS Q</p> <p style="text-align: center;">U-238 PZ-111-SD DIS Q S-5 DIS Q PZ-100-SD DIS Q</p>
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	<p style="text-align: center;">None</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Uranium (EML U-02)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	<p>Chemical recoveries were within control limits (75-110%).</p> <p>If chemical recoveries were <20% then check for spectral degradation.</p>	<p>S-5 TOT 15.7% - spectral degradation - qualify associated results as R</p> <p>Qualify the following results as J: PZ-111-SD TOT 118.2% S-5 DIS 32.4% PZ-110-SS DIS 70.2% I-4 TOT 26.0% I-4 DIS 27.7% D-3 TOT 35.2% D-3 DIS 39.9% PZ-100-SD TOT 116.5% PZ-112-AS TOT 67.5% PZ-112-AS DIS 47.9%</p>	<p>U-234, U-235, U238 S-5 TOT R</p> <p>PZ-111-SD TOT J S-5 DIS J PZ-110-SS DIS J I-4 TOT J I-4 DIS J D-3 TOT J D-3 DIS J PZ-100-SD TOT J PZ-112-AS TOT J PZ-112-AS DIS J</p>
Background Counts	<p>1. Background was measured</p> <p>2. Background counts duration was at least as long as the sample count duration</p>	<p>1. Yes</p> <p>2. Yes</p>	None
Field Duplicate	<p>1. Were field duplicates collected for every 10 samples?</p> <p>2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.</p>	<p>1. DUP 01 (13-07099) was collected as a field duplicate of I-4 - results were in control.</p>	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB at PZ-110-SS TOT - Th-228 (0.00 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty no qualification required - Th-230 (0.09 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty no qualification required - Th-232 (0.03 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty no qualification required 3. No Method blank - Thorium-228 (0.08 pCi/L) -Positive Blank Conc is <1.65 X blank uncertainty- no qualification required - Thorium-230 (0.16 pCi/L) -Positive Blank Conc is >1.65 X blank uncertainty- qualify samples as B+ - Thorium-232 (0.01 pCi/L) -Positive Blank Conc	all samples Th-230 B+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. Th-228 I-4 TOT 0.01 pCi/L I-4 TOT DUP 0.0 pCi/L both results <LLD Th-230 I-4 TOT 0.06 pCi/L I-4 TOT DUP 0.08 pCi/L both results <LLD Th-232 I-4 TOT 0.01 pCi/L I-4 TOT DUP 0.03 pCi/L both results <LLD	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Non-Detects	Is the LLD > the sample concentration.	Yes - see qualifications.	<p style="text-align: center;">Th-228</p> <p style="text-align: center;">I-4 TOT & DIS U PZ-100-SD TOT & DIS U PZ-100-SS TOT & DIS U PZ-110-SS TOT & DIS U PZ-111-SD TOT & DIS U PZ-112-AS TOT & DIS U S-5 TOT & DIS U</p> <p style="text-align: center;">Th-230</p> <p style="text-align: center;">I-4 TOT U PZ-100-SS DIS PZ-111-SD TOT U S-5 TOT & DIS U</p> <p style="text-align: center;">Th-232</p> <p style="text-align: center;">D-3 TOT & DIS U I-4 TOT & DIS U PZ-100-SD TOT & DIS U PZ-100-SS TOT & DIS U PZ-110-SS TOT & DIS U PZ-111-SD TOT & DIS U PZ-112-AS TOT & DIS U S-5 DIS U</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	No - see qualifications.	<p style="text-align: center;">Th-228 D-3 TOT & DIS Q</p> <p style="text-align: center;">Th-230 D-3 TOT & DIS Q PZ-100-SD TOT & DIS Q PZ-110-SS TOT & DIS Q PZ-111-SD DIS Q I-4 DIS Q PZ-112-AS TOT & DIS Q</p> <p style="text-align: center;">Th-232 S-5 TOT Q</p>
Standards and Reference Materials	<p>1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years.</p> <p>2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.</p>	<p>1. Yes</p> <p>2. Yes</p>	None
Chemical Yield (Tracer)	<p>Chemical recoveries were within control limits (75-110%).</p> <p>If chemical recoveries were <20% check for spectral degradation.</p>	<p>S-5 TOT 63.6%</p> <p>PZ-110-SS TOT 72.2%</p> <p>PZ-110-SS DIS 122%</p> <p>I-4 DIS 131.8%</p> <p>D-3 TOT 67.3%</p> <p>PZ-100-SD TOT 128.2%</p>	<p style="text-align: center;">Th-228, Th-230, Th-232 S-5 TOT J PZ-110-SS TOT J PZ-110-SS DIS J I-4 DIS J D-3 TOT J PZ-100-SD TOT J</p>

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Thorium (EML-Th-01)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 01 (13-07099) was collected as a field duplicate of I-4 - results were in control.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180 days)?	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB at PZ-110-SS TOT - Radium-228 (2.86 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify PZ-110-SS TOT as B+ 3. No Method blank - Radium-228 (2.43 pCi/L) - Positive Blank Conc is >1.65 X blank uncertainty - qualify samples as B+	PZ-110-SS TOT Ra-228 B+ All samples Ra-228 B+

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥ 5 times their MDC, the relative percent difference (RPD) was $\leq 20\%$. c) If either result is \geq their MDC, but < 5 times their MDC, the absolute value of their difference was $< 2 \times$ MDC.	1. Yes 2. Yes 3. I-4 TOT 5.20 pCi/L I-4 TOT DUP 3.00 pCi/L Range = 2.20 >2XLLD - qualify all samples as P	All samples Ra-228 P
Non-Detects	Is the LLD > the sample concentration.	See qualifications	PZ-100-SD DIS U PZ-100-SS DIS U
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	PZ-100-SD TOT Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-228 (904.0)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE: 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Gravimetric recoveries were within control limits (75-110%). Chemical recoveries were within control limits (75-110%).	Gravimetric Recovery: in control Chem Recovery: S-5 TOT 56% S-5 DIS 68.8%	S-5 TOT Ra-228 J S-5 DIS Ra-228 J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was ≤ 35%. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 01 (13-07099) was collected as a field duplicate of I-4 - results were in control.	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE(S): 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Data Package Completeness	1. All results forms and Case Narrative included? 2. All samples in COC present? 3. All notes in Case Narrative consistent with chemist's review of data package?	1. Yes 2. Yes 3. Yes	None
Sample Conditions and Preservations	1. Cooler temperature <6°C? 2. pH of aqueous samples <2? 3. Record of sample preservation and problems noted for sample conditions.	Samples were preserved and filtered in the field	None
Holding Times	Samples met holding time requirement (180	Yes	None
Matrix Spike/Matrix Spike Duplicates	1. Was at least one MS/MSD analysis performed for each method on each batch of samples of similar matrix or for each 20 samples, whichever is more frequent? 2. Were field blanks used for MS/MSD sample analysis? 3. Were spike recovery and RPD results reported in pCi/L? 4. Were MS/MSD results within lab established control limits? 5. Were RPD ≤ 20%?	No Matrix spikes performed.	None
Method and Field Blanks	1. Was at least one method blank, consisting of deionized distilled water, processed through each sample preparation and analysis procedure prepared and analyzed with every SDG, or for each batch of 20 samples, whichever is more frequent? 2. Was at least one field blank/matrix per sampling episode collected? 3. Were the associated blanks free of target analytes?	1. Yes 2. Yes FB at PZ-110-SS TOT - Radium-226 (0.03 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required 3. Yes Method blank - Radium-226 (0.13 pCi/L) - Positive Blank Conc is <1.65 X blank uncertainty - no qualification required	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE(S): 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Laboratory Control Sample (LCS)	1. Was LCS analyzed for every 20 samples or for each batch of samples whichever is more frequent? 2. Were LCS %R within 80-120%?	1. Yes 2. Yes	None
Laboratory Duplicate	1. Was one duplicate sample analyzed for each batch and each method? 2. Were duplicate results reported in pCi/L? 3. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are ≥5 times their MDC, the relative percent difference (RPD) was ≤ 20%. c) If either result is ≥ their MDC, but < 5 times their MDC, the absolute value of their difference was < 2 X MDC.	1. Yes 2. Yes 3. I-4 TOT 1.37 pCi/L I-4 TOT DUP 1.08 pCi/L Range = 0.29 <2XLLD - no qualification required	None
Non-Detects	Is the LLD > the sample concentration.	Yes	None
Uncertainty	For the sample results >LLD the combined standard uncertainty is less than 50% of the sample activity.	See qualifications	I-4 DIS Q S-5 TOT Q S-5 DIS Q
Standards and Reference Materials	1. The standards used for calibration are not aged more than four times the half-life from the certification date and have been recalibrated within the past three years. 2. All standards used in instrument calibrations were NIST traceable with certification, date certified, expiration dates, and DPM activities.	1. Yes 2. Yes	None

PROJECT NAME/NO. West Lake Landfill Operable Unit 1
LABORATORY: Eberline Services
PROJECT ID: 13-07098
MEDIA: Groundwater (Dissolved and Total)
FRACTION: Radionuclides - Radium-226 (903.0)
SAMPLE NUMBERS: PZ-111-SD, S-5, PZ-110-SS, I-4, PZ-100-SS, D-3, PZ-100-SD, PZ-112-AS
SAMPLE DATE(S): 7/9/2013

CRITERIA	Project Criteria	Comments/Qualifying Actions	Qualifiers Added?
Chemical Yield (Tracer)	Chemical recoveries were within control limits (75-110%).	Chemical recovery: S-5 TOT 56% S-5 DIS 68.8%	S-5 TOT J S-5 DIS J
Background Counts	1. Background was measured 2. Background counts duration was at least as long as the sample count duration	1. Yes 2. Yes	None
Field Duplicate	1. Were field duplicates collected for every 10 samples? 2. a) If both results are <MDC, then no duplicate comparison was made. b) If both results are >5 times their MDC, the relative percent difference (RPD) was $\leq 35\%$. c) If either result is > their MDC, but < 5 times their MDC, the absolute value of their difference was < 5 X the MDC.	1. DUP 01 (13-07099) was collected as a field duplicate of I-4 - results were in control.	None

ICB
8/1/13

Sample Description: I-4 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000648
 Batch Identification: 1307098B-UU
 Sample Identification: 12
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_013
 Chamber Serial Number:
 Detector Serial Number: 13
 Env. Background: System Bkgd 63309
 Reagent Blank: <not performed>

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/9/2013 7:18:50 AM
 Acquisition Date/Time: 8/1/2013 9:15:54 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.610 mL
 Effective Efficiency: 0.0518 +/- 0.0053
 Counting Efficiency: 0.1869 +/- 0.0035 on 12/15/2012 11:26:45 AM
 Chem. Recovery Factor: 0.2771 +/- 0.0289

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.279	101.64	19.59	1.36	0.00E+000	4.4
U-234	4.713	14.32	53.21	0.68	0.00E+000	4.9
U-235	4.407	5.32	91.11	0.68	0.00E+000	2.8
U-238	4.117	1.81	193.79	1.19	0.00E+000	2.8

T = Tracer Peak used for Effective Efficiency

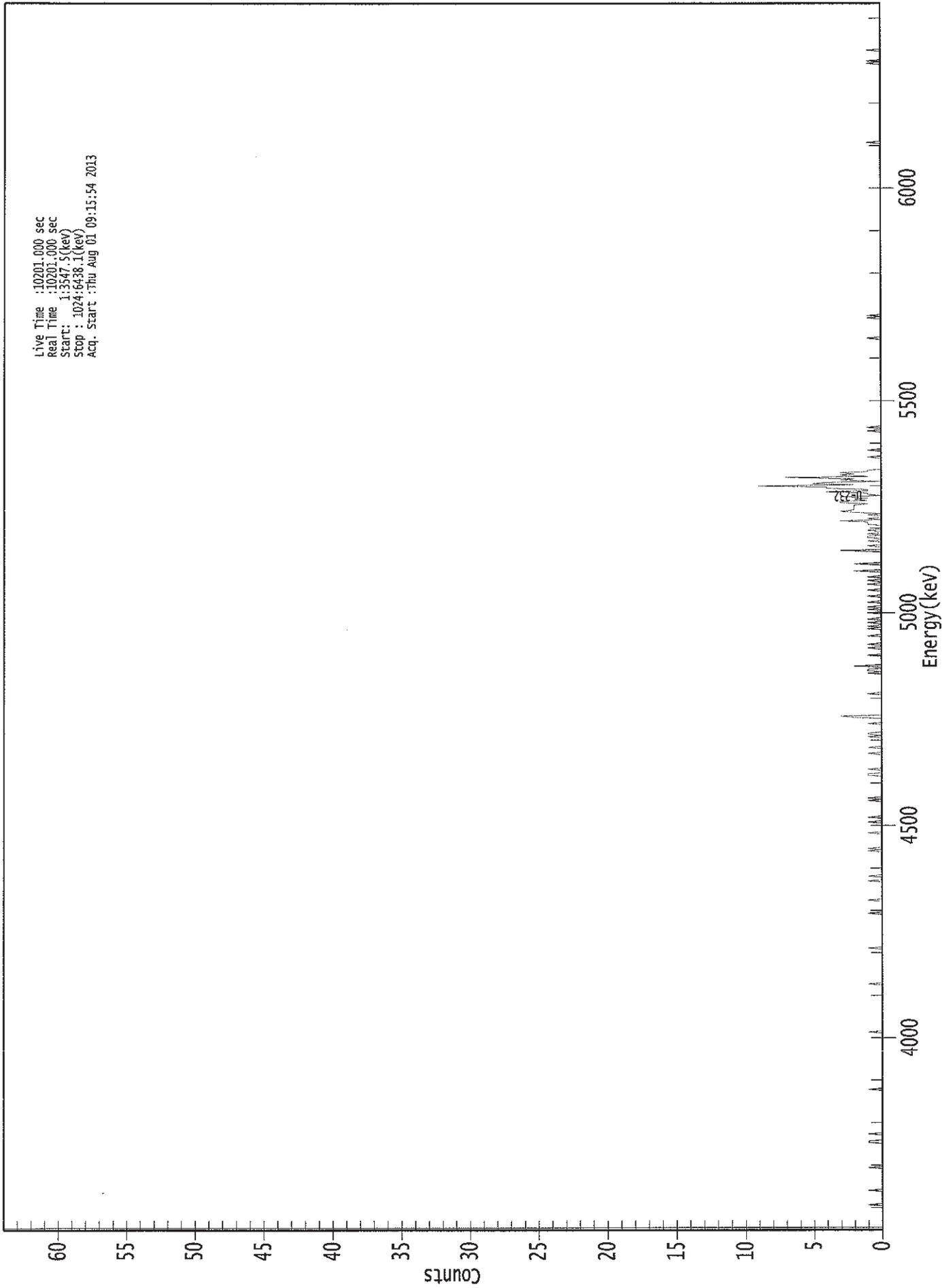
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.996	5302.50*	1.04E+001 +/- 2.10E+000	7.03E-001 +/- 1.41E-001
U-234	0.983	4761.50*	1.47E+000 +/- 8.35E-001	5.78E-001 +/- 1.16E-001
U-235	0.997	4385.50*	6.73E-001 +/- 6.28E-001	7.13E-001 +/- 1.43E-001
U-238	0.969	4184.40*	1.85E-001 +/- 3.60E-001	6.73E-001 +/- 1.35E-001

AG
8/1/13

0000064822.CNF

Live Time :10201.000 sec
Real Time :10201.000 sec
Start : 1:3547.5(kev)
Stop : 1024:6438.1(kev)
Acq. Start :Thu Aug 01 09:15:54 2013



2422

ROI Type: 1

ROI Type: 3

***** S P E C T R A L D A T A R E P O R T *****

Sample Title: 12

Elapsed Live time: 10201

Elapsed Real Time: 10201

Channel	-----	-----	-----	-----	-----	-----	-----
1:	10201	10201	0	0	0	0	0
9:	0	0	0	0	0	0	0
17:	0	0	0	0	0	1	0
25:	0	0	0	0	0	0	0
33:	0	1	0	0	0	0	0
41:	0	0	0	0	0	0	0
49:	0	0	0	0	1	0	0
57:	0	0	0	0	0	0	0
65:	0	0	0	0	0	0	0
73:	0	1	1	0	0	0	0
81:	1	0	0	0	0	0	0
89:	0	0	0	0	0	0	0
97:	0	0	0	0	0	0	0
105:	0	0	0	0	0	0	0
113:	0	0	0	0	0	1	0
121:	0	0	0	0	0	0	0
129:	0	0	0	0	0	0	0
137:	0	0	0	0	0	0	0
145:	0	0	0	0	0	0	0
153:	0	0	0	0	0	0	0
161:	0	0	0	0	0	1	0
169:	0	0	0	0	0	0	0
177:	0	0	0	0	0	0	0
185:	0	0	0	0	0	0	0
193:	0	0	0	0	0	0	0
201:	0	0	0	0	0	1	0
209:	0	0	0	0	0	0	0
217:	0	0	0	0	0	0	0
225:	0	0	0	0	0	0	0
233:	0	0	0	1	0	0	0
241:	0	0	0	0	0	0	0
249:	0	0	0	0	0	0	0
257:	0	0	0	0	0	0	0
265:	1	0	0	0	0	0	0
273:	0	0	0	1	0	0	0
281:	0	0	0	0	0	0	0
289:	0	0	0	1	0	0	1
297:	0	0	0	0	0	0	0
305:	0	0	0	0	0	0	0
313:	0	0	0	0	1	0	1
321:	0	0	0	0	0	0	0
329:	0	0	0	1	0	0	0
337:	0	0	0	0	1	0	0
345:	1	0	0	0	0	0	0
353:	0	0	0	0	0	0	1
361:	1	0	0	0	0	0	0

369: 0 0 0 0 0 0 0 0 0

Sample Title: 12

Channel	-----	-----	-----	-----	-----	-----	-----	-----
377:	0	0	0	1	1	0	0	0
385:	1	0	0	0	0	0	0	0
393:	0	0	0	0	0	1	0	0
401:	0	0	1	0	0	0	0	0
409:	0	0	0	1	0	1	1	0
417:	0	0	0	0	0	0	1	0
425:	0	0	0	2	3	0	0	0
433:	0	0	0	0	0	0	0	0
441:	0	0	0	0	0	0	0	1
449:	0	0	0	0	0	0	0	0
457:	0	0	0	0	0	0	0	0
465:	1	0	1	1	0	0	2	0
473:	0	0	0	0	0	0	0	1
481:	0	0	0	0	0	1	0	0
489:	1	0	0	0	0	0	0	1
497:	0	0	0	0	0	1	0	1
505:	0	0	1	0	0	1	0	0
513:	0	0	1	0	0	1	0	1
521:	0	0	0	1	0	0	0	0
529:	1	0	0	0	0	1	0	0
537:	0	0	1	0	0	1	0	0
545:	1	0	0	0	0	2	0	0
553:	0	0	0	2	0	0	0	0
561:	0	0	0	0	0	0	3	0
569:	0	0	1	0	0	0	1	0
577:	0	1	1	0	1	0	0	1
585:	0	0	0	0	1	1	1	3
593:	0	1	0	0	1	0	2	3
601:	2	2	2	2	2	1	3	3
609:	1	2	1	3	0	1	1	4
617:	1	1	4	4	9	2	5	4
625:	0	3	2	7	1	3	2	3
633:	1	1	0	0	0	0	0	0
641:	0	0	0	0	1	0	0	0
649:	0	0	1	0	0	0	0	0
657:	0	0	0	0	0	0	0	0
665:	0	0	1	0	0	1	0	0
673:	0	0	0	0	0	0	0	0
681:	0	0	0	0	0	0	0	0
689:	0	0	0	0	0	0	0	0
697:	0	0	0	0	0	0	0	0
705:	0	0	0	0	0	0	0	0
713:	0	0	0	0	0	0	0	0
721:	0	0	0	0	0	0	0	0
729:	0	0	0	0	0	0	0	0
737:	0	0	0	0	0	0	0	1
745:	0	0	0	0	0	0	0	0
753:	0	0	0	0	0	0	0	0
761:	1	0	1	0	0	0	0	0
769:	0	0	0	0	0	0	0	0
777:	0	0	0	0	0	0	0	0
785:	0	0	0	0	0	0	0	0
793:	0	0	0	0	0	0	0	0

801: 0 0 0 0 0 0 0 0 0

Sample Title: 12

Channel	-----	-----	-----	-----	-----	-----	-----	-----
809:	0	0	0	0	0	0	0	0
817:	0	0	0	0	0	0	0	0
825:	0	0	0	0	0	0	0	0
833:	0	0	0	0	0	0	0	0
841:	0	0	0	0	0	0	0	0
849:	0	0	0	0	0	0	0	0
857:	0	0	0	0	0	0	0	0
865:	0	0	0	0	0	0	0	0
873:	0	0	0	0	0	0	0	0
881:	0	0	0	0	0	0	0	0
889:	0	0	0	0	0	0	0	0
897:	0	0	0	0	0	0	0	0
905:	0	0	1	0	0	0	0	0
913:	0	0	0	0	0	0	0	0
921:	0	0	0	0	0	0	0	0
929:	0	0	0	0	0	0	0	0
937:	0	0	0	0	0	0	0	0
945:	0	0	0	0	0	0	0	0
953:	0	0	0	0	0	0	0	0
961:	0	0	0	0	0	0	0	0
969:	0	0	0	0	1	0	1	0
977:	0	0	0	0	0	0	0	1
985:	0	0	0	0	0	0	0	0
993:	0	0	0	0	0	0	0	0
1001:	0	0	0	0	0	0	0	0
1009:	0	0	0	0	0	0	0	0
1017:	0	0	0	0	0	0	0	0



QA SUMMARY REPORT
Review Of QA Results - Pulser Check

Date : 8/1/2013
Time : 5:57:00 AM

CHAMBER	DEVICE	PARAMETER	FLAG	DATE
Alpha 001	21f	ALL	Not Done	
Alpha 002	21f	ALL	Not Done	
Alpha 003	21f	ALL	Passed	8/1/2013 5:25:35 AM
Alpha 004	21f	ALL	Passed	8/1/2013 5:25:35 AM
Alpha 005	21f	ALL	Not Done	
Alpha 006	21f	ALL	Not Done	
Alpha 007	21f	ALL	Not Done	
Alpha 008	21f	ALL	Not Done	
Alpha 009	21f	ALL	Not Done	
Alpha 010	21f	ALL	Passed	8/1/2013 5:25:36 AM
Alpha 011	21f	ALL	Passed	8/1/2013 5:25:37 AM
Alpha 012	21f	ALL	Passed	8/1/2013 5:25:38 AM
Alpha 013	21f	ALL	Passed	8/1/2013 5:25:39 AM
Alpha 014	21f	ALL	Passed	8/1/2013 5:25:40 AM
Alpha 015	21f	Peak Energy	Action	8/1/2013 5:25:41 AM
Alpha 016	21f	ALL	Not Done	
Alpha 017	AIM730	ALL	Not Done	
Alpha 018	AIM730	ALL	Passed	8/1/2013 5:25:41 AM
Alpha 019	AIM730	ALL	Passed	8/1/2013 5:25:42 AM
Alpha 020	AIM730	ALL	Passed	8/1/2013 5:25:43 AM
Alpha 021	AIM730	ALL	Not Done	
Alpha 022	AIM730	ALL	Passed	8/1/2013 5:25:44 AM
Alpha 023	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha 024	AIM730	ALL	Passed	8/1/2013 5:25:45 AM
Alpha 025	AIM730	ALL	Passed	8/1/2013 5:25:46 AM
Alpha 026	AIM730	ALL	Not Done	
Alpha 027	AIM730	ALL	Passed	8/1/2013 5:25:47 AM
Alpha 028	AIM730	ALL	Not Done	
Alpha 029	AIM730	ALL	Passed	8/1/2013 5:25:48 AM
Alpha 030	AIM730	ALL	Not Done	
Alpha 031	AIM730	ALL	Passed	8/1/2013 5:25:49 AM
Alpha 032	AIM730	ALL	Not Done	
Alpha 033	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:50 AM
Alpha 034	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:51 AM
Alpha 035	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:53 AM
Alpha 036	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:55 AM
Alpha 037	Alpha Analyst100DC	ALL	Not Done	
Alpha 038	Alpha Analyst100DC	Peak FWHM	Action	8/1/2013 5:25:57 AM
Alpha 039	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:25:59 AM
Alpha 040	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:01 AM
Alpha 041	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:02 AM
Alpha 042	Alpha Analyst100DC	ALL	Passed	8/1/2013 5:26:04 AM

***** LIBRARY LISTING REPORT *****

Nuclide Library Title: Uranium

Nuclide Library Description: U-232,-234,-235,-238

Nuclide Name	Half-Life (Seconds)	Energy (keV)	Energy Uncert. (keV)	Yield (%)	Yield Uncert. (Abs.+/-)
U-232	2.174E+009	5302.500*	0.000	99.8000	0.0000
U-234	7.731E+012	4761.500*	0.000	99.8000	0.0000
U-235	2.221E+016	4385.500*	0.000	80.9000	0.0000
U-238	1.410E+017	4184.400*	0.000	100.2300	0.0000

* = key line

TOTALS: 4 Nuclides 4 Energy Lines

108
8/2/13

Apex-Alpha™

Sample Description: DUP 01 TOT
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000649
 Batch Identification: 1307099B-UU
 Sample Identification: 04
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_039
 Chamber Serial Number: 06027396A
 Detector Serial Number: 83109
 Env. Background: System Bkgd 63327
 Reagent Blank: <not performed>

Sample Size: 5.000E-001 +/- 0.000E+000 liter
 Sample Date/Time: 7/9/2013 7:28:24 AM
 Acquisition Date/Time: 8/2/2013 9:43:51 AM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.1 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.605 mL
 Effective Efficiency: 0.0244 +/- 0.0036
 Counting Efficiency: 0.1965 +/- 0.0034 on 4/20/2013 2:01:25 PM
 Chem. Recovery Factor: 0.1240 +/- 0.0185

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.232	47.49	28.62	0.51	0.00E+000	4.5
U-234	4.756	4.66	94.59	0.34	0.00E+000	3.0
U-235	4.458	1.49	190.02	0.51	0.00E+000	6.0
U-238	4.128	2.66	128.85	0.34	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

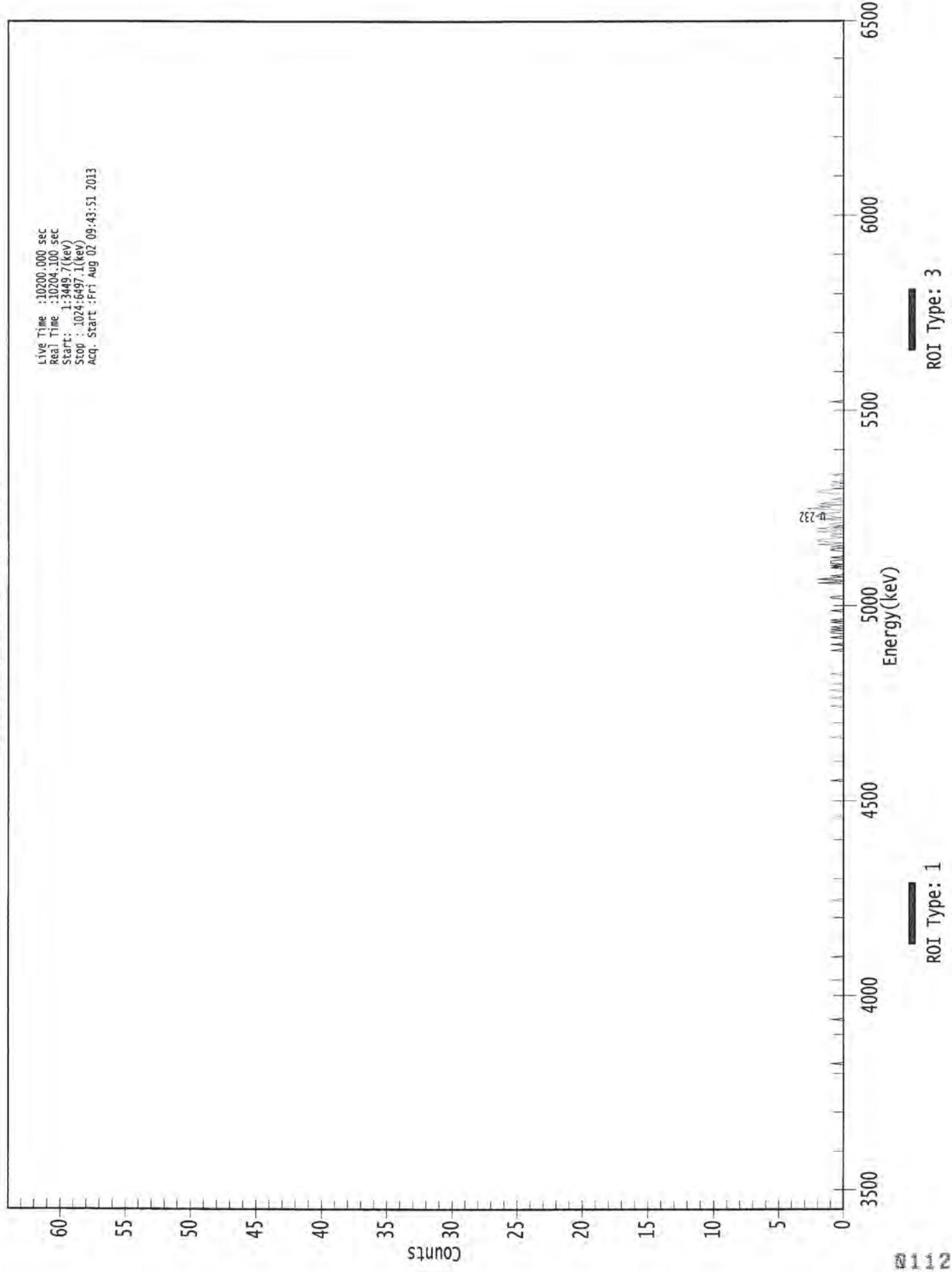
 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.966	5302.50*	1.04E+001 +/- 3.00E+000	1.14E+000 +/- 3.31E-001
U-234	1.000	4761.50*	1.02E+000 +/- 1.00E+000	1.04E+000 +/- 3.02E-001
U-235	0.963	4385.50*	4.00E-001 +/- 7.70E-001	1.41E+000 +/- 4.09E-001
U-238	0.978	4184.40*	5.77E-001 +/- 7.62E-001	1.04E+000 +/- 3.00E-001

AG
8/2/13

0000064947.CNF

Live Time :10200.000 sec
Real Time :10204.100 sec
Start : 1:3449.7(kev)
Stop : 1024:6497.1(kev)
Acq. Start :Fri Aug 02 09:43:51 2013



103
7/25/13

Apex-Alpha™

Sample Description: S-5 DIS
 Spectrum File: \\OR-ALPHA1\Canberra\ApexAlpha\Root\Data\00000639
 Batch Identification: 1307098A-UU
 Sample Identification: 07
 Sample Geometry: Shelf 2
 Procedure Description: U iso

Detector Name: Alpha_003
 Chamber Serial Number:
 Detector Serial Number: 3
 Env. Background: System Bkgd 62747
 Reagent Blank: <not performed>

Sample Size: 1.000E+000 +/- 0.000E+000 liter
 Sample Date/Time: 7/9/2013 9:15:58 AM
 Acquisition Date/Time: 7/25/2013 1:24:25 PM
 Acquisition Live Time: 170.0 minutes
 Acquisition Real Time: 170.0 minutes

Tracer Certificate: U232_UU-10A
 Tracer Quantity: 0.603 mL
 Effective Efficiency: 0.0566 +/- 0.0056
 Counting Efficiency: 0.1746 +/- 0.0033 on 12/15/2012 11:26:47 AM
 Chem. Recovery Factor: 0.3243 +/- 0.0325

Peak Match Tolerance: 0.150 MeV

 PEAK AREA REPORT

Nuclide	Energy (MeV)	Net Pk Area	Pk Area Error %	Ambient Backgnd	Reagent Backgnd	FWHM (keV)
U-232	T 5.271	109.98	18.79	1.02	0.00E+000	4.4
U-234	4.753	3.66	107.88	0.34	0.00E+000	3.0
U-235	4.374	2.83	120.54	0.17	0.00E+000	3.0
U-238	4.158	6.15	85.19	0.85	0.00E+000	3.0

T = Tracer Peak used for Effective Efficiency

 NUCLIDE ANALYSIS RESULTS

Nuclide	Id Conf.	Energy (keV)	Activity (pCi/liter)	MDA (pCi/liter)
U-232	0.993	5302.50*	5.16E+000 +/- 9.97E-001	2.95E-001 +/- 5.71E-002
U-234	0.999	4761.50*	1.72E-001 +/- 1.88E-001	2.24E-001 +/- 4.33E-002
U-235	0.999	4385.50*	1.64E-001 +/- 2.00E-001	2.41E-001 +/- 4.66E-002
U-238	0.995	4184.40*	2.87E-001 +/- 2.51E-001	2.79E-001 +/- 5.40E-002

AG
7/26/13

0000063979.CNF

Live Time : 10201.000 sec
Real Time : 10201.000 sec
Start : 1:34:48.4(keV)
Stop : 1024:65:49.5(keV)
Acq. Start : Thu Jul 25 13:24:25 2013

